INFO WORLD

MAY 28, 1990 | THE WEEKLY FOR PERSONAL COMPUTING PROFESSIONALS | VOLUME 12, ISSUE 22

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WINDOWS 3.0

An InfoWorld supplement detailing Microsoft's updated environment and the applications supporting it.

Laptops in Japan Signal Future For U.S. Market

BY RICHARD REIMER AND RON COPELAND

TOKYO — New laptops, palmtops, and other portable computers introduced for the Japanese market at the Tokyo business show last week provided a preview of the versions expected to hit the U.S. market by year's end.

Sharp and Mitsubishi both displayed laptops designed to compete with the NEC Ultralite. The Mitsubishi Maxy Note 286 and Sharp All-in-Note are both 4.4-pound notebook-size laptops powered by a 12-MHz 80C286 CPU. The two machines are very similar because the laptop is manufactured by Sharp for Mitsubishi. The display is EGA in the IBM English mode, although the Japanese mode supports VGA.

The Toshiba STN displays VGA color using a super-twist nematic display technology.

The $1,320 Sony PTC-500 Palm-Top Computer shuns the traditional keyboard in favor of a stylus-entry system.

This is the first appearance of the newly developed 2½-inch hard disk in Japanese domestic laptops. The 20-megabyte hard disk has a 23-millisecond access time and is much lighter than previous units.

Since NEC does not sell a Japanese version of its Ultralite, it has responded to the runaway popularity of Toshiba's Dynabook (in America, the T1000SE and T1200SE) with the 98 Note SX that has been upgraded to a 12-MHz 386SX. It has the same screen as the Toshiba and a 20-megabyte hard disk drive.

The 6.1-pound laptop with a single floppy drive will sell for $1,986. The hard disk version will cost $2,986.

A number of 386SX-based portables with color screens were also on display. Mitsubishi, Sharp, Toshiba, and Ricoh demonstrated models based on thin film transistor (TFT), super-

See Japan, Page 8

Users Eager to Test-Drive Windows

PC Managers Raise 3.0 Memory Management, LAN Support Issues

BY INFOWORLD STAFF

Windows 3.0's debut amid furor and fireworks at seven sites was declared great fun by industry participants, but many users in the audience said the new environment will be subject to close scrutiny before it explodes in the corporate marketplace.

But at least it's finally official, said buyers and sellers alike. Microsoft sales representative John Hand wore a button that read "Ask Me About Windows 3.0" at the New York City announcement. "For a year I've been getting calls," he said. "We couldn't say anything. Now, I'm going to wear this button even in my sleep."

Corporate managers, if uncertain how soon they'll embrace the program, are eager for a test drive.

"Memory management and LAN support were problems in the past. We'll know if those problems have been solved once we get our packages back to the office and try it out," said Julian Horwich, director of the Chicago Association of Microcomput-

See Windows, Page 89

"Character app users will get seduced by the graphical aspects," said Bill Gates.

CAROL HALEBIAN

Many Managers Hold Out for OS/2

Amid all the hoopla surrounding last week's Windows 3.0 debut, an entire group of corporate PC and MIS managers has been ignored — namely, the ones not especially enamored with the latest version of Microsoft's graphical windowing environment.

Many say they will not be using Windows on a widespread basis because of the high cost of upgrading machines to be suitable Windows platforms. Others say they will be implementing OS/2 directly, without taking the intermediate step of putting end-users onto Windows. Still others say Windows is not powerful enough to solve their corporatewide systems needs.

"To anyone who thinks his desktop is the center of the universe, Windows 3.0 looks great when compared to OS/2," said John Chapman, technology consultant in the planning architectures group at Amoco Inc., in Chicago. "Unfortunately, I

See OS/2, Page 89

Apple Expects Mac to Prosper in Graphical World

BY ERIC LACH

Despite the widespread expectation that Windows 3.0 will eat into Macintosh sales, Apple Computer Inc. officials and some industry observers contend that the Mac will prosper in a personal computer market that is racing to embrace graphical user interfaces.

"Microsoft is now telling people that they should be looking for a machine that is graphically oriented," said Jim Davis, Apple's director of system software marketing. "What people have to realize is that we are not the newcomers to this game. Microsoft is. We have been offering graphically oriented computers since 1984."

"The net effect of the announcement last Tuesday is not that Apple is a dead company,

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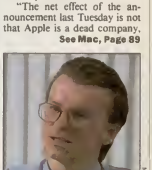
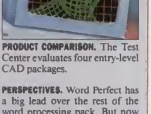


"The Macintosh's advantages go far beyond just its graphic look," said Apple Computer's Chris Espinoza.

RENEE LYNN

THIS WEEK



PRODUCT COMPARISON. The Test Center evaluates four entry-level CAD packages.

PERSPECTIVES. Word Perfect has a big lead over the rest of the word processing pack. But now it must handle the transition to a graphical interface.

After the Fall: Lotus, Novell Try to Regroup

BY BARBARA DARROW AND MARGIE WYLIE

The 11th-hour collapse of the Lotus-Novell merger touched off a fire storm of speculation last week about what went wrong and what the companies will do to recoup their lost time and energy.

Lotus chairman Jim Manzi has nixed the deal after Novell's last-minute demand for equal representation on the combined board of directors.

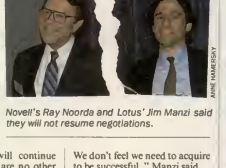
In separate press conferences, Manzi and Novell CEO Ray Noorda said they will not resume negotiations, but stopped short of ruling out future collaborations.

Lotus will evaluate such ventures on a case-by-case basis, Manzi said. He added that a current joint support agreement, a deal Lotus has with Novell and several vendors, will continue unchanged. There are no other joint marketing, selling, or product development pacts in force, he said.

Neither company admits to actively seeking other mergers or acquisitions. "We'll go back to doing what we were doing. We don't feel we need to acquire to be successful," Manzi said.

Lotus' growing focus on networked computing applications will not abate, especially given the corporate interest in Notes, Lotus' group information dissemination and retrieval prod-

See Lotus, Page 8



Novell's Ray Noorda and Lotus' Jim Manzi said they will not resume negotiations.

ANNE HAMERSKY

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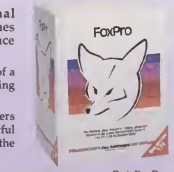

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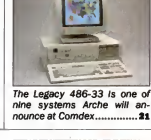
Image-in adds gray-scale editing to updated graphics package for Windows 3.0 18



The Legacy 486-33 is one of nine systems Arche will announce at Comdex 31

Extra for Windows 1.2 allows up to 26 IBM 3270 sessions on a variety of links 33

AT DEADLINE

Xerox Introduces Line of Multifunctional Products

Claiming to be the first vendor to introduce a single package with plain-paper fax, copier, printer, and scanner capabilities, Xerox Corp. last week announced four of the multifunctional products that have been dubbed Hydras. Although three machines will ship in July, purchasers won't be able to link them to computers until the company releases the RS-232 interface in the first quarter of 1991, Xerox said. Prices will range from $4,295, for a networkable fax/copier terminal, to $8,995, for a digital fax/copier.

— Roxanna Li Nakamura

Apple Settles Class-Action Suits

Apple Computer Inc. agreed to settle two class-action suits filed against it in 1989 for $5.65 million. The actions, Hussey v. Apple Computer et al. and Zeid et al v. Apple Computer, claimed damages to purchasers of Apple's common stock during the period January 17, 1989, through January 27, 1989. Shareholders filed suit when Apple released its first-quarter financial results on January 17, 1989, reporting record sales and earnings, and then 10 days later announced it would have to absorb the cost of expensive DRAM chips. Shareholders believed they should have been notified that earnings would decline in the second quarter.

— Patricia J. Pane

Seiko to Unveil Postscript Printer

Seiko Instruments will announce a Postscript-compatible color thermal printer at Comdex next week, the firm said. Based on the roll-fed Seiko 5500 engine, this printer will cost $7,000 and ship in August.

The printer will work on a network, and sports Centronics, RS-232, and Appletalk ports. The controller board is based on a high-speed RISC processor, and sources said it prints one page per minute.

— Kristi Coale

Netware 386 Gets Early Opposition

Network administrators still waiting for Netware 386 to deliver everything Novell Inc. promised a year ago will be disappointed when the company ships Version 3.1 on Wednesday, beta testers said. The product is solid, but not that different from the initial release, beta testers said. The most significant bug fixes and enhancements are invisible to the user, and although multiple protocol support is built into the product via the Open Data-Link Interface, the interface is useless without the protocol stacks that Novell is now building, they said. The first stack, for the Mac, is due in the third quarter, Novell said.

— Margie Wylie

Sacks Named InfoWorld Publisher

Jonathan Sacks, president of IDG Books Worldwide and former editor-in-chief of *InfoWorld*, has been named president and publisher of *InfoWorld*. He replaces Terri Hamilton. Sacks will remain president of IDG Books Worldwide, which will operate as a subsidiary of *InfoWorld*.

"In the short term, *InfoWorld* clearly will need to address the pent-up demand of prospective readers who want to subscribe to our publication," Sacks said. "We will be expanding our circulation, while maintaining our high readership qualification standards. *InfoWorld* will also review corporate user trends with an eye for new targeted editorial editions."

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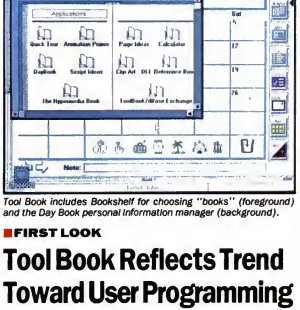

Tool Book includes Bookshelf for choosing "books" (foreground) and the Day Book personal information manager (background).

FIRST LOOK

Tool Book Reflects Trend Toward User Programming

By Michael J. Miller

Perhaps the most encouraging trend in software is the move toward more personal applications — applications that can be created by and for end-users with little or no programming experience.

By now I'm sure you've heard of Tool Book, a Windows 3.0 program from Asymetrix, the company headed by Microsoft cofounder Paul Allen. Tool Book is a terrific example of this trend toward allowing individuals to do at least some of their own programming. Tool Book is a personal applications development environment, or as Asymetrix likes to call it, a "software construction kit." In more traditional terms, it is an object-oriented programming environment that adds many of the features common to fourth-generation languages, but with an interface aimed at PC users, not programmers.

As an object-oriented environment, Tool Book follows many of the conventions of the field, particularly as popularized by Apple's Hypercard — although the terminology is somewhat different. In Tool Book, an application can consist of one or more "books," each of which can contain multiple "pages" that are are filled with various "objects." These objects can be fields (which contain text), graphics, or buttons (which perform various actions) — and you can tie scripts to any of these. This is quite similar to Hypercard, which uses stacks of cards rather than books of pages.

In addition, Tool Book lets you have many different kinds of fields, including a record

See Tool Book, Page 62

Agreement Reached on PC Cards

U.S., Japanese Firms Take Another Step to IC Card Standardization

By Mark Brownstein

An agreement between major hardware and software companies and electronic developers in the United States and Japan, may pave the way for the next standard for integrated circuit (IC) data storage and memory.

The first in a series of standardization agreements was made last week by the PC Memory Card International Association (PCMCIA) (see "U.S. Japanese Vendors Ready PC Card Standard," January 5, Page 21), in conjunction with the Japan Electronics Industry Development Association, comprising 40 major Japanese companies. The agreement specifies electrical and physical formats for credit-card-size solid-state memory cards, called PC Cards.

Although similar cards have been implemented in a number of products, including laser printers (as fonts or additional memory), industrial hardware, notebook or hand-held computers (such as the Poqet and Atari Portfolio), and hand-held organizers (Sharp Wizard), the cards were not interchangeable between units due to differences in connector, electrical, and software characteristics. The PCMCIA specification provides a uniform specification that will serve as a model for PC cards.

The PC Cards can use a variety of memory types, said Renee Bader, who chairs the electrical interface committee of the PCMCIA, and who is the product planning manager at Poqet. "The standard covers SRAM [static RAM], EEPROM, Flash, and masked ROM," Bader said. Additions to the specification, due in September, will include DRAM and pseudo static RAM.

"We've created a standard to make these [PC Cards] look equivalent to a floppy disk," Bader said.

Although the cards will be treated in much the same way as floppy disks, they will not be forced to emulate the 360K, 720K, 1.2-megabyte or 1.44-megabyte formats of current floppy disk drives. Instead, the

Memory cards like Poqet's will be interchangeable among laptop and hand-held PCs.

cards will be addressed in terms of all memory available and will have varying capacities, according to Neal Chandra, vice president of business product development at Poqet, and chairman of the PCMCIA's marketing committee. Currently, cards range in size from 512K to 4 megabytes, but will be available "in excess of 10 megabytes very soon," Chandra said.

In addition to being used as floppy replacements, PC Cards can be used for software or data distribution, and to expand system memory. Products using the standard will appear at fall Comdex, analysts said.

'Father of Ethernet' Retires From 3Com

Metcalfe's Departure Follows Benhamou's Rise to 3Com Presidency

By David J. Buerger

Robert M. Metcalfe, the "father of Ethernet" and founder of 3Com Corp., last week announced his retirement from his positions as vice president of marketing and member of 3Com's board of directors, effective June 4.

"There are times when you should either lead, follow, or get out of the way," Metcalfe said. "I have led and followed at 3Com, and now it's time to leave."

Metcalfe's departure comes on the heels of Eric Benhamou's promotion as the $400 million networking company's president, and a general corporate restructuring. Metcalfe, who had previously served as 3Com's first president and chief executive officer, admitted his disappointment that he was not chosen by the board to again be 3Com's president.

Metcalfe, 44, contemplated retiring when 3Com merged with Bridge Communications in 1987. Thoughts of retirement resumed last December 21 when 3Com's board decided he would not be president, Metcalfe said.

"His resignation was not unexpected. The timing just wasn't certain," Benhamou said.

As for the future, Metcalfe said, "I have no immediate plans other than to play tennis and spend time with my family this summer in Maine."

"If I were to stay in the networking industry, it would be with 3Com — I wouldn't start or join another company," he said.

One possibility is a return to academia, Metcalfe said. He was a consulting associate professor of electrical engineering at Stanford University from 1975 to 1982.

Metcalfe will continue as a consultant to 3Com. Often referred to by coworkers as "Dr. Bob," Metcalfe was a research engineer for Xerox at the Palo Alto Research Center (PARC) before founding 3Com.

"There are times when you should either lead, follow, or get out of the way," said 3Com's Bob Metcalfe.

Milestones for 'Dr. Bob' and 3Com

1973	Invented Ethernet at Xerox PARC
1976	Published first disclosure by Xerox of Ethernet in *Communications of the ACM*
1978	Ethernet patent issued
1979	Founded 3Com Corp.
1980	DEC/Intel/Xerox "blue book" Ethernet specification first published
1982	Shipped industry's first PC Ethernet adapter
1983	IEEE adopts 802.3 specification as a standard
1988	Received IEEE Alexander Graham Bell Award for his contributions to LAN technology
1989	International Standards Organization adopts Ethernet as the only approved LAN standard

Oracle Creates Distribution Subsidiary, Inks DEC Deal

By Scott Mace

BELMONT, CA — Oracle Corp. last week formed a U.S. distribution subsidiary and signed a deal with Digital Equipment Corp. (DEC) to jointly market its Oracle Financials software for DEC VAX and Ultrix systems.

Gary D. Kennedy was named president of the new Oracle U.S.A. subsidiary, which will be responsible for distribution and sales of Oracle products.

Oracle database products are responsible for sales that are now approaching $500 million per year.

Oracle president and CEO Larry Ellison was named chairman of the board, succeeding Don Lucas, who was elected chairman of the company's executive committee.

According to Pete Tierney, Oracle's senior vice president of corporate marketing, DEC wants to capitalize on the fact that an extremely high percentage of Oracle Financials sales also involve the purchase of new hardware as well.

Through the agreement, DEC and Oracle will exchange both technical and marketing assistance, although Oracle is not planning to put any emphasis on DEC's DBMS systems, according to Oracle's Tierney.

Two Windows Developers Favor Porthole SMK Over Mirrors

BY STUART J. JOHNSTON

CHICAGO — Two of the biggest users of Mirrors, Micrografx's Windows-to-OS/2 porting tool, said they have jumped ship for Microsoft's "Porthole" Software Migration Kit (SMK).

The shipment of beta versions of the SMK this month — significantly earlier than industry insiders had predicted — has preempted use of Mirrors, which began going out to users last year.

"As a product that other [developers] will use, [Mirrors] is dead," said Rod Zimmerman, manager of market development for Menlo Park, California-based Gupta Technologies, which had been a major beta site for Mirrors until this month.

Another major Mirrors beta site, The Whitewater Group of Evanston, Illinois, has also switched to the SMK, according to Dana Huston, a company spokesperson.

"We weren't really sure Micrografx was going to fully support Mirrors, and Microsoft was fully behind the SMK," Huston said.

But Richardson, Texas-based Micrografx claims it was never really in the systems software business anyway.

"The original idea behind Mirrors was for our own applications," said George Grayson, president of Micrografx.

Mirrors and the SMK — aka Porthole — have had a fierce, and controversial, rhetorical battle over which would be the tool of choice for Windows developers interested in porting their code directly to OS/2.

Early this year, Redmond, Washington-based Microsoft admitted that it was working on the SMK and announced a "technology exchange" with Micrografx. Microsoft said the SMK only contained concepts and not actual code from Mirrors.

Microsoft has also been demonstrating a technology that will let Windows applications run directly under OS/2, Version 2.0, and will deliver that capability when OS/2 2.0 rolls out later this year.

While that does not obviate the need for a porting tool for OS/2 1.2 — or an upcoming interim release which may be numbered 1.3 — many industry watchers believe that 1.X versions will have only limited penetration and that most users will wait for the release of 32-bit OS/2 2.0 before they seriously make any moves.

— Peggy Watt also contributed to this report.

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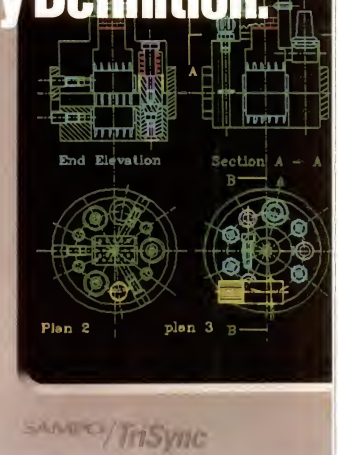

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Word Perfect Holds Off on Update to DOS Version of Product

BY YVONNE LEE

In an effort to accommodate customers who have complained about too-frequent updates, Word Perfect Corp. will not release the next version of its DOS word processor until at least July 1991.

"I think that the radical changes from 4.2 to 5.0, and the smaller changes from 5.0 to 5.1 are taking a while to absorb," said Pete Peterson, Word Perfect executive vice president.

The company waited 18 months between the release of Version 5.0 in May 1988 and Version 5.1 in November 1989, but Peterson estimated that only 25 percent to 30 percent of major customers have completely upgraded to Version 5.1. Users say both time and cost prevent them from keeping current with the latest release.

"The acquisition process takes months," said Richard Wilkes, publisher of *Word Perfectionist*, a newsletter put out by the Word Perfect Support Group. "By the time they decide to commit to it, then there's a new version."

"It starts getting expensive when you're upgrading all the time," Wilkes said. "It's very expensive in terms of manpower and direct costs."

The next version will probably appear between 18 and 24 months from the release of Version 5.1, according to Peterson. "We're going to do the work, but we're not going to release it until the market is ready."

Although Peterson would not comment on new features in the upcoming version, he said the company planned to concentrate on performance and would add only "one or two features." "We'd like 5.2 on DOS to be easier to use, faster, and maybe even a little bit smaller," Peterson said.

The company hopes that by delaying upgrades, it will be easier to support the product and to have similar feature sets on all platforms. "When OS/2 and Windows come out, we want them to be current," Peterson said.

Although Word Perfect supports earlier versions on its toll-free lines, most support operators are trained in the current version only.

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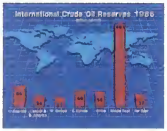

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Lotus Freelance Plus 3.01

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Japan

Continued From Page 1

twist nematic (STN) and thin film diode (TFD) technologies. These technologies will enable 10- and 11-inch screens to display high-contrast color images at VGA resolution. All of the manufacturers stated that domestic releases will be later in the year, but Sharp seemed ready to jump the gun and deliver an equivalent unit to the United States first.

Epson has taken advantage of the monitor technology used in its 2- and 3-inch portable color televisions in its new laptop, the PC386LSC. The 19-pound, 16-MHz 386SX-based laptop has a screen capable of displaying 16 colors from a palette of 4,096. This corresponds to analog RGB at a resolution of 640 by 400. The display uses metal-in metal (MIM) active-matrix technology and provides a superior bright screen display. The screen quality was significantly better than that of the NEC color portable.

IBM Japan exhibited its 549 laptop "Online Note." This 4.4-pound laptop is an obvious clone of the Mr. Mytool Magus manufactured by Ricoh. It also resembles the Tandy portable, and rumor has it that a similar unit is slated for release by IBM in the United States. It is compatible with the Japanese IBM 55 series and is powered by an 8-MHz 80C186. The display is a 640-by-400 monochrome screen that is not backlit. It contains an internal modem and operates for 3½ hours on rechargeable Nicad batteries.

Mitsubishi's Maxy Note 286 uses a 2½-inch hard drive.

IBM Japan also released the Model 5545, which is a 21-pound 20-MHz 80386, dubbed "a portable OS/2 machine." Especially notable was its red LCD screen that delivers a 24-by-24-dot kanji display, or 1,024-by-768-pixel resolution in 16 gradations in DOS mode. This is the highest resolution currently offered in a portable.

Sony featured its new $1,320 Palmtop Computer PTC-500, a hand-held computer based on a 68HC000 CPU. Without keyboard, input is only possible by pen entry. Peripherals include a 2-inch disk, modem, 64K memory card, and printer.

Evergreen Ships 386 Upgrade Card

Plug-Compatible Card Makes 286-Based Systems Into 386SX PCs

By Mark Brownstein

Evergreen Technologies Inc. is now shipping a compact board — slightly larger than Intel's 386SX chip — that users can drop into their 80286-based systems in place of the old microprocessor.

The Evergreen 386 Superchip is a plug-compatible replacement for the 80286 on AT-class system boards, according to the company. Once installed, the system operates as a 386SX system, running at the same clock speed as before.

While the product is not an "accelerator" product, it does allow the use of memory already installed in 286 systems, the company said. The board also recognizes and supports 80287 math coprocessors.

The board includes a 16-MHz processor and can run in 286 systems with clock speeds up to 16 MHz. It adds the capability to use the 386 protected mode, used by Windows 3.0, and other 386 memory-management software.

"You can remap your ROMS into 386 RAM, freeing up more of your 640K of memory," said Mike Magee, president of Evergreen Technologies.

"The performance of a system doesn't change [when using the board], but you do get the ability to use better memory management — you can use EMS, remap your ROMS, and get the speed improvements that can be gotten from software specifically written for a 32-bit processor," Magee said.

Installation of the product involves removal of the 80286 chip from its socket and plug a tool provided, and replacement with the 386 Superchip. Since there are a few types of 80286 connectors currently in use, adapters are being developed allowing installation into any 80286-based system.

The Evergreen 386 differs from devices such as the All Charge Card, which convert memory in a 80286 system into memory that can be addressed with memory managers. The other cards remap memory, but do not provide the 16-bit internal data path of the 386SX, according to Evergreen. Unlike other cards, which don't replace the CPU, the Superchip provides full 386SX memory addressability, the company said.

The Evergreen 386 Superchip is available now at an introductory price of $295.

Evergreen Technologies Inc., 1325 N.W. 9th St., Corvallis, OR 97330; (800) 757-7341, (503) 757-7341.

Lotus

Continued From Page 1

uct, Manzi said.

Meanwhile, Novell will look outside for what Noorda called "application tools" — databases, spreadsheets, and word processors — for network environments through joint marketing arrangements.

As for the derailment of what looked to be a done deal, Manzi admitted being stunned by Novell's 11th hour, 59th minute" demand for equal board representation.

"The one thing we said way back in March [when negotiations started] was that we'll never accept anything but a 4-3 board, because that would be grounds for disaster," Manzi explained.

"You've got to remember that Ray came to us in March and put this on the table," Manzi said. Noorda conceded that he had agreed to those terms from the outset.

Ironically, Novell's balk may leave the company on the block regardless of Noorda's contention that it is not for sale. "The sharks are circling — once you whet shareholders' appetites, it's hard to turn that off," explained Rich Dorfman, an analyst with Broadview Associates, in Fort Lee, New Jersey.

Observers said Novell's sudden decision could impair its credibility in future endeavors. "They threw in the one monkey wrench they knew would stop the whole works. If I were a potential buyer, I'd be very chary of dealing with them from now on," warned Jack McGrath, editor of *Mux Newsletter*.

Jeffrey Tarter, editor of *Softletter*, agreed that the maneuver may put a blot on Novell's image. "Here's a company that either reneged on its deal or has a CEO that can't control his own board. It's also highlighted the fact that Noorda has a serious succession problem on his hands."

Novell's motivation remains cloudy. Observers speculated that Noorda tried to build a more dominant role for himself than Manzi was willing to accept. In the final weeks of negotiations, Lotus had agreed to change the company's name to Lotus/Novell Corp. and to promote Noorda as chairman of the combined entity — two conditions that were not in the letter of intent.

Manzi discounted a theory that Novell's board, backed by irate stockholders, forced Noorda to back out. "Our view is that if he [Noorda] wanted this to happen on the terms that we had negotiated over and over again, it would have happened. Ray's a 12 percent shareholder — he speaks for shareholders with more authority than anyone else," he said.

Despite the estimated millions spent to set up the merger, analysts said it was better to kill the engagement of what may have been a bad marriage.

Ashton-Tate Ends Windows Holdout

Company Previews Product Similar to Applause for Windows 3.0

Demonstrating that it has found religion, long-time Windows holdout Ashton-Tate previewed a bona fide Windows 3.0 graphics product at Microsoft's New York rollout last week.

The unnamed product had a similar appearance to Applause 2.0, as well as all the functionality of that product. But it moves beyond the charting-intensive capabilities of the DOS-based Applause.

"This isn't a port of Applause," said Richard Dym, director of Ashton-Tate's graphics applications group. "This product is one we've built from the ground up, specifically to take advantage of Windows 3.0." The product has not yet been assigned a name or an announcement date, according to Dym.

The new program consists of an outliner with a two-way data link with presentations and style sheets. In addition, it has the powerful graphics and illustration capabilities that Dym feels bring the product up to the level of Powerpoint and Persuasion.

Users can either use the outliner and style sheets to build presentations, or create their own graphics from scratch using the program's illustration tools, Dym said.

— Kristi Coale

Chips Run Multifunction Imagers

National Semi Announces Three Processors for Imaging Peripherals

By Roxanna Li Nakamura

Systems that can combine the functions of scanning, fax, laser printing, voice recording, modem communications, and graphics display in one box may be one step closer after last week's introduction of three dedicated processor chips by National Semiconductor.

Generically called "Hydra" systems, because many functional blocks share one printing body, such combination peripherals offer the promise of both reduced desktop space requirements and as much as a third less cost than a collection of single-function peripherals.

Several manufacturers — including Canon, Everex, Hewlett-Packard, Mannesmann Tally, Olivetti, Samsung, and Goldstar — joined in National's introduction event, but none would comment upon future products that would be based on the new processors. Typical design times of 12 to 18 months are expected before the emergence of such products.

National designed the three embedded processors for imaging applications, said Russ Johnson, director of National's imaging group. Multifunctionality is built in, so product differentiation will come primarily from software added by the peripheral manufacturers, he said.

The 32CG160 Integrated System Processor, the bottom of the line, is single-tasking and combines scanning, printing, and display terminal functions. It can reduce the component count in a page printer by up to 22 percent, with a 33 percent cut in system cost. The midrange chip, the 32FX16 Imaging/Signal Processor, can be software-programmed for fax, data modem, laser Postscript printing, and digital voice recording, National spokesmen said.

Concurrent processing is added in the top of the line, the 32GX320 High-Performance 32-Bit Integrated System Processor. This module, half the size of a typical add-in PC card, can multitask functions such as Postscript printing, visual display, data modem, and voice recording. It can reduce component count by 20 percent and cost by 30 percent in typical applications, National said.

Samples of all three processors are available now, with volume production in the fourth quarter, according to National. Pricing in 100-unit quantities will be $39.90 each for the CG160, $33.80 for the FX16, and $147 for the GX320.

National's new processors are not the only route to developing Hydra products, however. Xerox Corp. last week announced four multifunctional peripherals based on Hitachi microprocessors. (See At Deadline item, Page 3.)

National Semiconductor Corp., 2900 Semiconductor Drive, P.O. Box 58090, Santa Clara, CA 95053-8090; (408) 721-6573.

To find a 286 portable with desktop features, you have to know where to look.

You've just discovered what may be the perfect balance between PC power and portability.

The battery operated Toshiba T1600. It packs a powerful 12MHz 286 microprocessor, one full megabyte of RAM that's expandable to 5MB, and a 144MB 3.5" diskette drive.

Plus your choice of 20MB or 40MB hard disk models.

Equally impressive is its 640x400 EGA display with 16 gray scales for dazzling graphics.

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T1600: Battery-powered 80C286/12MHz; 20MB and 40MB hard disk models; 144MB 3.5" diskette drive; 1MB RAM expandable to 5MB; detachable, backlit EGA-compatible LCD; removable, rechargable battery pack; coprocessor socket; 7 standard interfaces; dedicated modem slot and one Toshiba slot for general purpose options.

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Especially since the MultiSync 3D also has a microprocessor-based digital control system that provides automatic screen configuration, lets you select the ideal resolution for your software, and even has a

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Although regularly backing up data is time well spent, you don't want to spend any more time than you absolutely have to shuffling floppies and listening to grinding disk drives.

So you'll be glad to know that our unique combination of advanced technologies makes backing up with the new Norton Backup a whole lot faster than you ever dreamed possible.

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Of course, you don't need to know any of that to appreciate the Norton Backup right away.

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The Norton Backup loads at a keystroke and automatically configures itself to your particular system—no ponderous parameters to enter.

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Which means that saving—and restoring—everything from selected files to entire disks is as easy as point and shoot.

How often you point and shoot is up to you. Because the Norton Backup offers a choice of three user interface levels.

(Not to mention five backup types, three levels of data verification, three levels of data compression and five display modes all the way up to 50 lines per screen.)

In fact, if you take advantage of our handy setup files, you—or someone on your staff who thinks backup is something you do with a gearshift—can execute the whole process in as little as three keystrokes.

Whichever interface you choose, you'll know *before* you start precisely how much time and how many floppies you'll need.

You won't need many floppies, because the Norton Backup packs the most data onto the fewest diskettes. It even does the formatting for you.

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Although we give you more choices than any other program, one of the nicest things about the Norton Backup is the choice you don't have to make.

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We'll send you a Norton Backup demo disk.

Backup and burn rubber. Our unique combination of advanced technologies makes backing up with the new Norton Backup faster than you ever dreamed possible.

What is Peter Norton doing with a backup software package?

Why, what comes naturally, of course.

As you probably know, our classic, bestselling Norton Utilities® has saved the data of hundreds of thousands of grateful PC users around the world.

With the remarkable new Norton Backup™ we're out to save your data once again—*before* you have a chance to lose it.

What's more, we save it more quickly, more reliably and with much less effort on your part than any other program you can buy.

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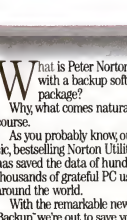
But since there are a couple of other companies out there making similar claims, you might want to read on.

To see if we can back it up.



Selecting and deselecting files couldn't be more flexible—or intuitively obvious. Choose our unique Preset Mode and you can execute the entire process in three keystrokes. Whatever level of interaction you use, you'll backup in less time than ever before.

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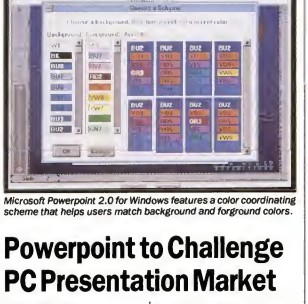


Microsoft Powerpoint 2.0 for Windows features a color coordinating scheme that helps users match background and forground colors.

Powerpoint to Challenge PC Presentation Market

By Kristi Coale

Poised to take on Harvard Graphics and Lotus Freelance for a share of the presentation graphics market, Microsoft will ship in early June Powerpoint 2.0 for Windows, the first application the company has written specifically for Windows 3.0.

Powerpoint 2.0 features Powerpoint Graph, the first Microsoft utility to use Dynamic Data Exchange (DDE) technology. Microsoft has published the specifications for DDE, hoping developers will write applications to support it.

Through DDE technology, developers can concentrate on the main function of their applications instead of having to develop various utilities to work with them. For example, Powerpoint doesn't have a built-in charting function; it is strictly a presentation graphics package. With Graph, which launches from within Powerpoint, a user can enter the data to build a graph or chart. Once finished, the user is taken back into Powerpoint to find the chart in place.

To assist users in creating aesthetically pleasing presentations, Powerpoint has a color schemes window, which offers several suggestions on color combinations and coordinates the combinations between the text, foreground objects, and the background.

The program lets users save entire presentations as one file, instead of the one-slide-per-file routine in other such programs. It also lets users have more than one presentation open at one time. For offices with Macintoshes and PCs, Powerpoint files can be exchanged between the two platforms easily for editing and incorporating into other presentations.

Powerpoint will sell for $495.

Microsoft Corp., 1 Microsoft Way, Redmond, WA 98052-6399; (206) 882-8080.

Revised New Wave Environment Is Close to Fulfilling HP's Promises

By Roxanna Li Nakamura and Peggy Watt

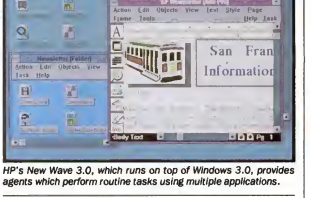
Hewlett-Packard Co. last week took a giant step toward delivering on promises for its New Wave desktop environment by announcing agent task automation and network object storage capabilities in an update that runs on top of Windows 3.0.

HP officials emphasized that the New Wave update — dubbed Version 3.0, even though the last released U.S. version was 1.11 — adds value to Windows 3.0. This release provides agents, which act like supermacros to automate tasks that can span applications, according to HP.

HP downplayed the technical underpinnings of New Wave's features. "Our target customer is someone who doesn't want to know how computers work to get his or her job done," said Webb McKinney, general manager of HP's Santa Clara, California, information systems division.

The agents, represented onscreen as a Max Headroom-like icon, can automatically do routine tasks using one or many applications. They can be scheduled to work at specified times, or users can start them by clicking on their icons or labels in a pull-down menu.

"The agent works cooperatively with the environment, and permits a standard way for objects to work together cooperatively," said Bill Crow, research and development project manager for HP's personal software division. "It records actions in an editable script — not the user keystroke per se, but its integration with the application."



HP's New Wave 3.0, which runs on top of Windows 3.0, provides agents which perform routine tasks using multiple applications.

The object-sharing capability lets users share data files and associated applications on a network by simply moving icons in and out of graphical folders.

New Wave comes bundled with the WYSIWYG New Wave Write word processor. Four other applications — Lotus 1-2-3, Future Soft's Dynacomm communications package, and full-motion video board packages from New Media Graphics and Videologic — are shipping now in versions customized to work with New Wave's object management facility. An additional 21 are slated for release this quarter, according to HP.

Any other Windows or DOS application can be used with New Wave, but to access them using the icon-based interface, users need to add a "bridge," code that encapsulates or registers the application with the environment. HP will provide a disk with bridges for 22 popular applications with Version 3.0, but users can also easily develop their own bridges.

The $195 New Wave 3.0 is slated to ship in August, HP said. Users of New Wave 1.0 or 1.1 can upgrade for $50. Upgrades will be free to anyone who purchases the current version from now until the time Version 3.0 becomes available.

New Wave comes with the CBT and hypertextlike help facilities built in, so third parties can easily add these features to their software products, according to a video distributed by HP to developers.

Version 3.0 will run on 286- and 386-based systems with at least 640K of RAM, 2 megabytes of extended memory, MS-DOS 3.2 or later, Windows 3.0, and a hard drive with at least 9½ megabytes of free disk space.

Hewlett-Packard Co., 19310 Pruneridge Ave., Cupertino, CA 95014; (800) 752-0900.

New Wave Applications Release Timetable

AVAILABLE NOW

- Future Soft Dynacomm
- HP New Wave Write
- Lotus 1-2-3, Version 2.2
- New Media Graphics Video Windows NW
- Videologic DVA-4000

SECOND-QUARTER RELEASE

- Access Softek Dragnet
- Candlelight Wave Builder
- Dexotek Canada Utility Library
- Dexotek Canada Office Accessories
- Glockenspiel Commonview
- HP New Wave Mail
- McCallum-Varey Locator
- Microview Fax
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Bridge Integration Program Updated

Softbridge Also Developed Recorder Utility Built Into Windows 3.0

By Peggy Watt

NEW YORK — An update of the Bridge integration program for Windows 3.0 from The Softbridge Group and an environmental macro recorder built into the new version of Windows were introduced last week at Microsoft's Windows announcement here.

Recorder is a new Windows 3.0 utility that allows users to save a sequence of keystrokes, mouse movements, and mouse button clicks, defined to execute with a hotkey. It comes with the new environment, and was developed by The Softbridge Group.

The same developer also unveiled Bridge, Version 2.0, an update of its command language for Windows, intended to help Windows and character-based DOS applications work more closely in a graphical interface. New features include improved network support to better accommodate LAN development, a link to the Windows 3.0 help facility, and support for cascading menus and proportional fonts.

"We're very glad to have this out," said Gregory M. Knee, Softbridge's director of product management.

The Bridge Tool Kit helps users tailor the combined desktop of MS-DOS and Windows applications into a unified environment, adding them to the same menus and designing standard dialog boxes and icons. Corporate users often rely on Bridge tools for product and interface testing, according to Knee.

The update runs on all versions of Windows, and its applications are compatible with earlier versions of Bridge, the developer said. It retains its $695 price; run-time versions cost $125.

The Softbridge Group, 125 Cambridge Park Drive, Cambridge, MA 02140; (617) 576-2257.

Borland Announces Paradox Engine for Windows

Putting other rivalries temporarily aside, Borland International joined programming languages competitor Microsoft to announce a new version of its Paradox Engine at the Windows 3.0 rollout.

The Paradox Engine is a tool that lets programmers write applications with direct access to Paradox data via standard programming languages such as C. Without this kind of tool, most databases yield their data only to applications written in a proprietary fourth-generation language, such as Paradox Applications Language.

Version 2.0 of the Paradox Engine adds support for Windows 3.0 as well as two new DOS programming languages.

A Dynamic Link Library (DLL) allows programmers to link Windows applications to the Paradox Engine 2.0.

The DLL allows multisession and multiuser access and lets more than one application use a single engine.

Currently, the engine provides an "object layer" that lets programmers write applications in C, C++, and Turbo Pascal under DOS. Borland will support more direct links in the future via the unannounced C++ for Windows.

Version 2.0 also supports Borland's Virtual Runtime Object-Oriented Memory Management (VROOMM) technology through a C++ class library.

The engine will be available in August for $495. Upgrade pricing was not available at press time.

Borland International Inc., 1800 Green Hills Road, P.O. Box 660001, Scotts Valley, CA 95066; (800) 331-0877.

— Margie Wylie

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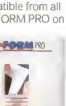

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DELRINA

Envelope Manager Produces Bulk Mail Envelopes, Labels

By Yvonne Lee

Envelope Manager, recently released by PSI Associates, lets users take advantage of lower postage rates and save time on large mailings.

The $149 Envelope Manager was originally marketed to government organizations to help them follow postal addressing regulations, and it can save money for those with mass mailings of over 250 pieces, according to PSI.

The program prints envelopes, labels, and flyers, and encodes them with symbols for routing through the U.S. Postal Service's equipment. Envelope Manager users mailing more than 500 items can save 5 cents per envelope on bar-coded, sorted First Class mail; the savings will be even more after February 1, 1991, when the price of a First Class stamp climbs to 30 cents.

The cost of sending bar-coded, sorted mail is going to increase from 20 cents to 24.3 cents, said Gus Ruiz, a communications manager for the U.S. Postal Service. "They are saving 5.7 cents by bar-coding the mail." Customers will receive a 3-cent-per-envelope discount on unsorted, bar-coded mailings larger than 250 pieces, Ruiz said.

The Envelope Manager can import .TIF files, allowing users to save the turnaround time for the Postal Service and graphic arts firms to produce bulk mail flyers and business reply envelopes.

Users can print envelopes from the Envelope Manager database or use a utility to capture the address from a character-based word processor.

PSI Associates, 247 High St., Palo Alto, CA 94301-1041; (415) 321-2640.

DTG to Show Versions Of System Sleuth for Macintosh, Windows

System Sleuth, a diagnostic program that analyzes key system and setup components in PCs, will soon be available in versions for the Mac and for Windows.

System Win Sleuth will let users of Windows 2.X and 3.0 perform memory management tasks to help analyze characteristics of the virtual machine environment defined by Windows, according to the developer, Dariana Technology Group (DTG).

System Win Sleuth is configured as an extensible shell, so applications developers can write custom enhancements to the program. Its menu-driven interface supports templates for display of graphical objects, viewers for text or data files, and modules for menu selections.

System Mac Sleuth identifies the type of Mac being analyzed, the disk accessories installed, Inits in force, SCSI slots, color and monochrome attributes, serial and parallel ports, Finder and System versions, and all available cdevs and drivers. It can also determine network resources and capabilities.

Each product costs $149 and will be demonstrated at Comdex and PC Expo. They are expected to ship in August.

Dariana Technology Group Inc., 7439 La Palma Ave., No. 278, Buena Park, CA 90620; (714) 994-7400.

— Mark Brownstein

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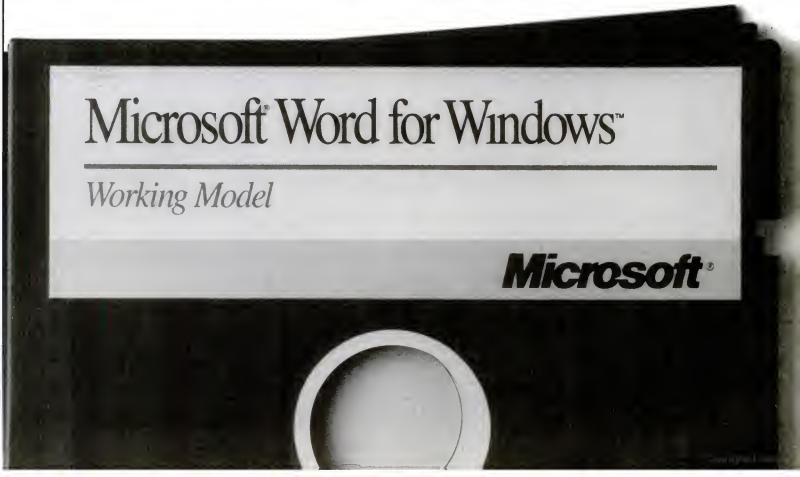

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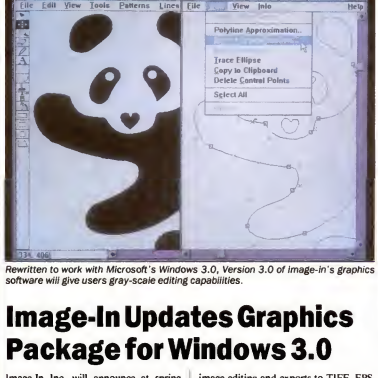

Rewritten to work with Microsoft's Windows 3.0, Version 3.0 of Image-In's graphics software will give users gray-scale editing capabilities.

Image-In Updates Graphics Package for Windows 3.0

Image-In Inc. will announce at spring Comdex that gray-scale editing has been added to its suite of integrated graphics programs, in an upgrade written to take advantage of Windows 3.0.

Version 3.0 of the Image-In graphics software includes five modules, available as a package for $795, that offer comprehensive image processing capabilities. "You get all these packages that compete very well on an individual basis and also integrate seamlessly in a single window," said Ward Johnson, Image-In's president.

Image Scan & Paint, available separately for $149, offers scanner input control and paint tools to edit and export images to DTP packages. Image Plus, $349 if sold alone, features gray-scale image editing and exports to TIFF, EPS, GEM, and other file formats. Image Read, priced at $349 alone, is a trainable OCR module that supports several European character sets. Image Vect, also $349, lets users convert bit-mapped images to vector files and export files in the .DXF and AI file formats. Image Panorama, $99 by itself, is an image database that lets users find images by paging through icons or by looking at keyword labels.

Version 3.0 will ship about four weeks after Comdex, Johnson said. Current users can upgrade for $100.

Image-In Inc., 406 E. 79th St., Minneapolis, MN 55420; (800) 345-3540.

— Roxanna Li Nakamura

Macromind, Aldus, Xerox Desktop Exploring Multimedia on Windows

BY KRISTI COALE AND PEGGY WATT

With Windows 3.0 offering a more capable DOS graphics environment, Macintosh multimedia product developers are exploring new opportunities.

Macromind Inc. announced last week a Windows Player application and Dynamic Link Library (DLL) for Windows 3.0. The DLL version of the Macromind Windows Player is being developed for use with Tool Book, a Windows application development product from Asymetrix Corp. The Player will let users launch Macromind Director documents from within any application built with Tool Book, according to Asymetrix.

Macromind expects to ship in July a developer version of the Macromind Windows Player, and in August to release the Macromind Windows Player for end-users, Macromind said. Application licensing begins at $250.

Aldus Corp., which identified its multimedia tools as Persuasion, Supercard, and Super 3-D, acknowledged "work in progress" on a Windows version of Persuasion, to be very much like its Mac product. Aldus expects it to ship this year, said Larry Spelhaug, Aldus' vice president of marketing.

The new product borrows the Autotype template function from its Macintosh counterpart, includes such Presentation Manager features as floating guides, and is dynamically linked between the presentation and outline screens, Spelhaug said.

Aldus officials also described, but did not demonstrate, Pagemaker 4.0 for Windows 3.0. A $25 interim update to support Windows 3.0, Pagemaker 3.01, is scheduled to ship in June, Aldus said.

Not to be outdone in the desktop publishing arena, Xerox Desktop Software announced its Windows 3.0 version of Ventura Publisher last week. The Windows version features all the advanced capabilities in Ventura Publisher Professional Extension and Network Server, such as support for Windows-compatible networks, easier font selection, and index generation.

This $895 Windows version of Ventura Publisher is scheduled to ship in July. A new DOS version will ship in June and the OS/2 and Mac versions will ship in September, Xerox said.

HDC Offers Pop-Up Utilities, Menu Editor for Windows 3.0

BY PEGGY WATT

NEW YORK — HDC Computer Corp. introduced a collection of nine pop-up utilities and a revised menu editor designed specifically for Windows 3.0 at the Windows unveiling here last week.

HDC First Apps 1.0 is a renamed, updated version of HDC Windows Manager, which includes a new character set that users can cut and paste into applications, and Art Gallery, an electronic scrapbook to store clip-art images, the company said.

HDC also has updated its other Windows Manager utilities to run with Windows 3.0, said Connie Waite, HDC's marketing director. They include the Memory Viewer, which shows the system memory use in all three of Windows 3.0's modes (real, standard, and enhanced, as well as expanded memory); System Enhancer, which provides utilities to run applications and organize placement of windows; Startup, to configure a start-up screen; Background, to customize the Windows background with applications or art; and the user-defined Screen Saver and Auto Save.

Windows Express 3.0 provides tools for use by system administrators to define and design Windows menus for workgroups, and for individual workstations on a network, Waite said. A "Quick Key" provides function-key access to frequently used documents, and a library of more than 200 icons is available for DOS or custom applications.

Because both new products require Windows 3.0, HDC will still market its earlier versions for Windows 2.X users, Waite said. Each product costs $99.95; current users who acquired the product after April 1 will get free upgrades; for others, upgrades cost $19.95.

HDC Computer Corp., 6742 185th Ave. N.E., Redmond, WA 98052; (206)

Most Recent Wave of Updated Accounting Software Shipping

BY SCOTT MACE

Computer Associates leads the latest parade of companies to offer revised accounting packages, including Great Plains Software and Sourcemate Information Systems.

Version 6.0 of Accpac Plus General Ledger and Financial Reporter for DOS and OS/2 is set to ship in June. The new release provides users with more processing flexibility, comprehensive batch management, increased audit controls, and improved management reporting, the company said.

Also due in June are revised versions of Accpac System Manager and Windowing System Manager for DOS, as well as System Manager/2 for OS/2. The new versions are compatible with all Accpac Plus 5.X modules, which along with Accpac Plus Lan Pak, also will be upgraded to 6.0 versions, Computer Associates said.

System Manager now allows for larger data files, supports 13-digit currency values, accepts international currency symbols and formats, and provides faster file access and printing. EMS support and larger DOS window support have also been added.

Accpac Plus GL sells for $795. Windowing System Manager is $195, System Manager/2 is $245, and Lan Pak is $395. Upgrades are free for maintenance support subscribers, and other registered users can upgrade to Accpac Plus GL and Lan Pak for $195 each. Registered users of Windowing System Manager and System Manager/2 can upgrade for $75 each.

Boasting an improved payroll module, Great Plains' Accounting Series 5.3 for DOS LAN and single-user systems is now shipping. The module tracks worker's compensation, employer contributions, and union reporting information, and it can send reports to multiple destinations simultaneously. Screen routines are 25 percent faster on screen-intensive applications. Most major Great Plains modules sell for $795 each. Network Manager, which supports four workstations, sells for $995.

Sourcemate's recently released Accountmate Version III has twice the reporting capabilities of previous versions, and contains more than 350 new features in posting, maintenance, reporting, and other functions, according to company officials.

Computer Associates International, 711 Stewart Ave., Garden City, NY 11530-4787; (516) 227-3300.

Great Plains Software, 1701 S.W. 38th St., Fargo, ND 58103; (800) 456-4417, (701) 281-3130.

Sourcemate Information Systems Inc., 20 Sunnyside Ave., Mill Valley, CA 94941; (415) 381-1011.

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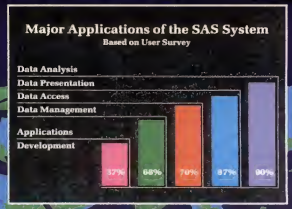

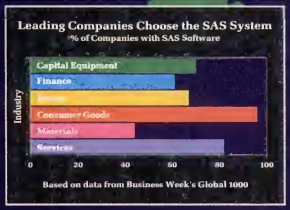

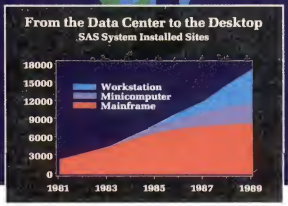

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Whitewater Group Updates Its Tools For Windows 3.0

NEW YORK — The Whitewater Group last week rolled out Windows 3.0 updates of its entire family of development tools, including its seminal object-oriented programming language, Actor.

The Chicago-area company also introduced a $395 object library for creating 2-D graphics applications called Object Graphics, which will ship July 1.

Actor 3.0, which costs $695 and ships next month, provides complete support for Windows 3.0, including the memory management scheme and cascading menus. It also features completely revised documentation. Programs can now be up to 2 megabytes in size and still run on a 640K system, according to the company.

Wintrieve 3.0, an Indexed Sequential Access Method (ISAM) system that costs $395, will also ship in June. ISAM can be called from Actor and other Windows-compatible languages, including C, Pascal, and assembly language.

The Whitewater Resource Toolkit for Windows 3.0 will cost $195 and ship in the third quarter, said Dana Huston, a company spokesperson. The package features tools to simplify creation of Windows resources, such as dialog boxes, bit maps, icons, and pull-down menus.

Registered users of earlier versions of Actor can upgrade to 3.0 for $75 and subscribers to the Gold Support Plan will receive the upgrade at no charge.

The Whitewater Group Inc., 1800 Ridge Ave., Evanston, IL 60201; (800) 869-1144, (708) 328-3800.

— Stuart J. Johnston

Data + Plus Upgrade Can Access as Many As Seven Databases

Upgraded to access up to seven databases, a Dbase file-compatible DBMS is available for the first time in a version without copy protection.

Data + Plus is a menu-driven DBMS compatible with Dbase III and IV files (see "Data + Plus Is Dbase Alternative," December 11, 1989). The new Version 4.0 of Data + Plus lets users run the report and label functions against either a flat file or up to seven database files, according to its publisher, Plano Computer Sales. Its scan mode lets users edit or add records with up to seven database files in use. Scan mode also lets users import or export memos into databases.

Complex queries can be built with Data + Plus' pull-down menus, and the program can build and save an unlimited number of relations between data files for later retrieval and instalation.

Data + Plus includes an applications generator to design custom data entry screens; each form can have up to seven associated reports and seven labels with an index. Users can run applications from the Data + Plus dot prompt or with Dprun, the $55 run-time program.

Version 4.0 costs $99; Plano will still sell the standard Data + Plus for $44.95, including install/uninstall copy protection. Upgrades are available for current users. The program runs on PC compatibles with 512K of RAM.

Plano Computer Sales, 1001 Lockhart, Plano, TX 75023; (214) 517-8662.

— Scott Mace

Fox Ships Foxpro 1.02 Free to All Registered Users

The free upgrade promised to Foxpro 1.0 users in January is finally going out to all registered users.

Fox began shipping Foxpro 1.01 in February, when LAN and run-time versions shipped. Single-user Foxpro users who requested the upgrade received it, but Fox continued to make minor improvements, culminating in Foxpro 1.02, which shipped to all single-user, multiuser, and run-time registered Foxpro owners on May 15. The free upgrade will streamline technical support by assuring that all users have the same release, said Fox president David Fulton.

Foxpro 1.02 includes an In Window command clause, establishing a parent-child relationship between two windows. Child windows can only move within the confines of the parent window. Databases can now be opened for read-only access, and the Compile command allows removal of debugging information from compiled code to reduce file size.

A Fox spokesman acknowledged that Foxpro may not be 100 percent compatible with Foxbase Plus code, as has been advertised, but the differences arise only because code that works in Foxbase Plus, using traditionally restricted Dbase words such as "count," will not run in Foxpro due to more thorough error checking.

Single-user Foxpro sells for $795, Foxpro/LAN sells for $1,095, and the Foxpro run time sells for $500.

Fox Software, 134 W. South Boundary, Perrysburg, OH 43551; (419) 874-0162.

— Scott Mace

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Printer emulation	✓ IBM, HP PCL	HP PCL
Std. plotter emulation	✓ Yes	No
Font card slots	✓ 2	1
Std. input paper tray capacity	✓ 200	50
Std. output paper tray capacity	✓ 100	50
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*Dealer prices will vary.

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HARDWARE

Mouse Systems to Upgrade PC Mouse

By Nico Krohn

Touting it as the most accurate mouse on the market, Mouse Systems Corp. has announced plans to upgrade its optical mouse, and is also introducing two hand-held scanners.

PC Mouse III will provide a true resolution of 300 counts per inch (cpi), said Jonathan Bloom, a spokesman for the company. PC Mouse and PC Mouse II give resolutions of 100 and 200 cpi, respectively, he said.

Unlike mechanical mice, Mouse Systems' optical mice measure movement using an infrared beam that is reflected off a shiny pad. This metallic pad contains a fixed grid that provides a more exact way to measure movement in precise intervals (cpi) than other methods, the company said.

Although some mechanical mice achieve resolutions as high as 400 cpi, they are prone to skipping and sticking because of dirt that collects on users' mouse pads, Bloom said. This means they can miss as much as 15 to 30 cpi; the PC Mouse III misses only one in 10,000 counts, or one count every 33.3 inches, Bloom said.

A second new feature of PC Mouse III is that it is compatible with two-button, three-button, or PS/2-style mouse standards, Bloom said. Buttons can be configured for left-handed use as well, he added.

The $149.95 mouse, expected to be released midsummer, will include software that lets users adjust the number of counts per inch from 30 to 30,000. Bundled software also allows PC Mouse III to be used as an interface to Lotus 1-2-3.

Mouse Systems also plans to release two hand-held scanners this summer. PC Pagebrush Color will cost less than $1,000 and will require only two passes over an 8½-by-11-inch document to capture it. It will allow users to scan bound pages without removing them from the binder and will achieve a resolution ranging from 100 to 400 dots per inch (dpi).

PC Pagebrush/32, a black-and-white scanner that will cost $399, will output 32 shades of gray. Images can be stored in .PCX, .CUT, .EPS, .IMG, and TIFF files. Optical character recognition software will be bundled with the scanner, providing resolutions up to 400 dpi.

Mouse Systems Corp., 47505 Seabridge Drive, Fremont, CA 94538; (415) 656-1117.

Mouse Systems optical PC Mouse III can be configured for right- or left-handed use.

Sony Unveils Palm-Size CD ROM Reader in Japan

Device Has On-Board Retrieval Software

By Richard Reimer and Nico Krohn

TOKYO — A palm-size CD ROM reader priced at under $400 for the Japanese market was debuted by Sony Corp. at the Tokyo Business Show held here this month.

The battery-powered Data Diskman EB (Electronic Book) weighs 550 grams and features a small QWERTY keyboard, a 2-by-2½-inch LCD screen, and reads CD ROM discs that measure 3.2 inches across.

A spokesman for Sony in Japan said the company may adapt the product to U.S. CD ROM formats. Although there is no corresponding model currently scheduled for the American market, OEM production is possible, he said.

A spokesman for Sony's San Jose, California, office said there are no immediate plans for a U.S. introduction.

In Japan, the computer will cost the U.S. equivalent of $386 — far less than current retail prices for CD ROM drives. Software for the computer, which is under development at several Japanese companies, will cost an estimated $19 to $132 per disc.

The CD ROM reader was designed as a portable database, and contains on-board retrieval software that allows applications developed according to Sony's specifications to be read by the system. Sony expects 18 major Japanese publishers to supply software for the system by the projected July 1 ship date.

The search and retrieval software will allow users to do word, keyword, menu, multisearch, and consultation searches. Data access times are similar to floppy disk access times, according to the company.

The device will ship with a single disc that contains five different Japanese and English language dictionaries.

The Data Diskman EB is also equipped with a video output port that allows it to be connected to a television set or video player, though it lacks PC input or output ports.

Sony's battery-powered Data Diskman EB CD ROM reader includes an output port for connection to a television or video recorder.

Arche to Debut Nine Systems at Comdex

By Roxanna Li Nakamura

A bevy of new systems from Arche Technologies Inc. is slated to debut at spring Comdex in Atlanta, including two EISA-bus 33-MHz 486-based and four ISA-bus systems that boost performance through mainframe-like memory management.

The EISA-bus systems, which Arche has benchmarked at 20 million instructions per second (MIPS), were designed to deliver workstation performance and mainframe stability on the more economical PC platform, according to Isaac Levanon, Arche's president and CEO.

The Legacy 486-33 EISA will be priced at $10,255 for a base model with 4 megabytes of SIMM RAM; a 256K flagged register copy-back secondary cache; a 1.2-megabyte 5¼-inch floppy drive; five 5¼-inch half-height drive bays; a 101-key keyboard; and MS-DOS 3.3 and GW Basic. The system has four 32/16/8-bit, two 16/8-bit, and two 8-bit expansion slots; one parallel and two serial ports; and a Weitek 4167 socket. The system's total RAM is expandable to 64 megabytes on the motherboard.

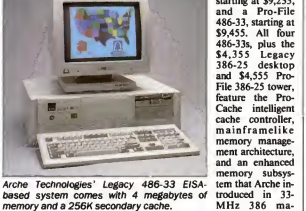
The Pro-File 486-33 EISA will be priced at $10,455 for a base configuration like the Legacy 486-33 EISA's, except that it comes with a tower case and different drive bays. The system's six drive bays — two 5¼-inch full-height, two 5¼-inch half-height, and two 3½-inch half-height — can be used to add up to 2.63 gigabytes of storage.

Among the seven ISA models to be unveiled will be an AT-bus Legacy 486-33, priced starting at $9,255, and a Pro-File 486-33, starting at $9,455. All four 486-33s, plus the $4,355 Legacy 386-25 desktop and $4,555 Pro-File 386-25 tower, feature the Pro-Cache intelligent cache controller, mainframelike memory management architecture, and an enhanced memory subsystem that Arche introduced in 33-MHz 386 machines it shipped earlier this year.

Arche will also announce a warranty option that gives users two years of on-site service by TRW for only $149. TRW charges about $249 for a one-year on-site service plan, Levanon said. The systems are also covered by Arche's standard two-year warranty, under which service is provided at TRW or reseller depots.

The new systems will be ready to ship 60 to 90 days after Comdex, Levanon said.

Arche Technologies Inc., 48881 Kato Road, Fremont, CA 94539; (415) 623-8100.



Arche Technologies' Legacy 486-33 EISA-based system comes with 4 megabytes of memory and a 256K secondary cache.

Antex to Ship 'Audiographics' Board

Add-In Card Offers Stereo Sound, VGA Graphics on a Single Board

By Paul Worthington

Now that many multimedia software vendors are moving from the Macintosh platform to a PC running Windows, Antex Electronics Corp. addresses the question of how to upgrade the standard IBM or compatible to the sound and video quality expected by Mac users with its "audiographics" add-in board.

The AV-16 has extended VGA graphics, high fidelity digital stereo, and NTSC video output all on one full-size card that plugs into the expansion slot of any PC. The product is ideally suited for applications where audio must be digitally stored, processed, and interleaved with full color graphics, according to the company.

The VGA graphics card uses the LSI video processor from Headlands Technology, and supports CGA, EGA, and Hercules as well as the IBM VGA graphics standard with an on-board video BIOS. The adapter has a 16-bit data path and high-speed interface, which Antex said will give it a performance up to 10 times higher than standard IBM VGA.

Additional graphics modes are also allowed through the use of the 1-megabyte RAM display buffer. Computer graphics can be directly output to either television monitors or VCRs from the NTSC composite video card.

A Texas Instruments digital signal processing chip is at the heart of the audio controller, which provides either mono or two-channel stereo at a 4:1 compression ratio. Volume can be digitally controlled, and the chip works on software-selectable interrupts. The board's output can power standard eight-ohm speakers.

The AV-16, available in July for $895, is aimed at OEMs and systems integrators, but it can be installed by the end-user, the company said.

Antex Electronics Corp., 16100 South Figueroa St., Gardena, CA 90248; (213) 532-3092.

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December 26, 1989

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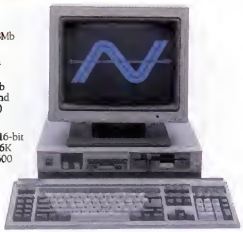

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PC Magazine December 26, 1989 reviewed the Northgate MicroStation 386/20. This system has been upgraded and is now named the "SlimLine 320."

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AGI Announces Two 25-MHz 486 Systems

Two 25-MHz 1486-based systems are slated to ship at the end of June from Everex subsidiary AGI Computer Inc., which also has plans to introduce a 33-MHz version in July.

The AGI 4000A desktop and AGI 4100A tower feature a 64K second-level static RAM cache and have performance ratings exceeding 11 MIPS, said Brian Stadtmiller, product manager.

The 4000A desktop will list for $7,395, and will include a zero-wait-state base system with 4 megabytes of RAM in SIMM modules; ESDI floppy and hard disk controller; 1.2-megabyte 5¼-inch floppy drive; one serial and one parallel port; eight expansion slots; and a 101-key AT-style keyboard.

The system has five half-height drive bays, a 200-watt power supply, and is socketed for a Weitek 4167 math coprocessor. RAM can be expanded up to 8 megabytes on the motherboard and to a total of 16 megabytes through an 8-megabyte 32-bit proprietary memory board.

The AGI 4100A tower system, which will list for $7,995, is the same as the 4000A except that it has four half-height and two full-height drive bays and a 250-watt power supply.

Both systems will be available with 256K of cache memory. Pricing has not yet been set, Stadtmiller said.

AGI Computer Inc., 48460 Kato Road, Fremont, CA 94538; (415) 683-2800.

— Roxanna Li Nakamura

Everex subsidiary AGI Computer Inc. will offer the AGI4000A tower system, a 25-MHz 486-based machine that includes a 64K secondary memory cache.

Core Working on MCA Bus-Master Controller For Faster IBM Drives

Planning for faster drives expected from IBM, Core International shipped a Micro Channel bus-master hard disk controller to beta-test sites last week.

Core's CNT-MCK MCA controller is designed to handle current drives with a top transfer rate of 15 megabits per second (mbps) as well as upcoming 24-mbps models, said spokesman John Simonds.

The controller supports up to two internal or external IBM ESDI or ST-506 drives, Core's drives, and the new series of IBM drives, Simonds said.

Drivers for the CNT-MCK provide software compatibility with DOS, Netware, and OS/2. Moving data from disk to memory in these environments takes one cycle instead of two due to bus mastering, which lets the adapter bypass the host's DMA controller for direct access to system memory.

Faster drives and I/O access should improve PS/2 acceptance for network file service, Simonds said. The 16-bit card works in a standard MCA slot. A 32-bit model that will offer data streaming on enhanced PS/2s is expected by fall, and Core may show prototypes at PC Expo in New York next month, he added.

IBM representatives point to Core bus-master drive controllers and the AOX 486 Micro Master card as upgrade options made possible by Micro Channel Architecture for the older PS/2 models.

Scheduled for June production, the CNT-MCK controller will cost $495.

Core International, 7171 N. Federal Highway, Boca Raton, FL 33487; (407) 997-6055.

— Patrick Dryden

Compaq Announces A VGA-Compatible Monochrome Monitor

Compaq last week added a VGA-compatible monochrome monitor to its display options.

The non-interlaced monitor offers a 14-inch anti-glare flat screen, 6-foot signal cord, tilt-swivel base, and external centering controls. A reverse-video switch lets users toggle display modes between black-on-white and white-on-black.

Top resolutions are 640 by 480 for graphics and 720 by 400 for text, with support for up to 64 shades of gray.

Available now through Compaq resellers, the monitor costs $299.

Compaq Computer Corp., 20555 SH 249, Houston, TX 77070; (713) 370-0670.

— Patrick Dryden

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AT&T Adds 286 Workstation With Remote Boot Capability

By Roxanna Li Nakamura

AT&T Computer Systems is now shipping a 286-based workstation for use as a diskless LAN node or as a stand-alone PC.

The 6286/EL Workgroup System is based on a 12½-MHz 80286 CPU and is available in diskless, single-floppy, and floppy disk with hard drive configurations. VGA, LIM 4.0, two serial and one parallel ports, and keyboard and mouse ports are built into the system board.

The diskless CPU M30 system is priced at $1,499 for a base system with 512K of RAM and a 101-key keyboard. Three 16-bit expansion slots are available for networking, enhanced communications, and other add-on boards. RAM is expandable to 4 megabytes on the system board, and up to 16 megabytes using AT-bus expansion boards.

The CPU M31 configuration, priced at $1,599, adds a 1.44-megabyte 3½-inch floppy drive and controller on the system board.

The CPU M32 adds a 40-megabyte hard drive and an on-board AT intelligent hard disk controller for a list price of $2,499.

The 6286/EL Workgroup System has been certified to work as a DOS or OS/2 client under AT&T's Stargroup LAN Manager Server Software and under Novell's Netware, Versions 2.12 and 2.15.

As an element in AT&T's Applications Operating Environment, it is designed to work in a multivendor, standards-based environment, said Tanya Kobishbha, division manager of AT&T's client/server system marketing.

Remote boot capability for Stargroup LANs will be provided by a $99 Remote Boot Board and a $395 Stargroup Software Remote Boot Server, slated to ship at the end of the second quarter.

AT&T Computer Systems, 1 Speedwell Ave., Morristown, NJ 07960; (800) 247-1212.

AT&T's 286-based 6286/EL is certified for use in DOS-, OS/2-, and Novell Netware-based network applications.

ACC to Announce Single-Chip Controller For 286, 386SX PCs

By Nico Krohn

ACC Microelectronics Corp. is slated to announce at spring Comdex in Atlanta that it has put an AT controller on a single chip, reducing to five the minimum number of components that laptop manufacturers need to build either an 80286 or a 386SX computer.

Touting it as an industry first, the ACC-2036 incorporates all the system logic for a 286 or 386SX system in a 208-pin, single-chip package, said Jack Yuan, product marketing director at ACC. Both 286 and 386SX microprocessors are supported by switching a pin, according to Yuan.

"This chip will mean a lot to the end-user. They [industry watchers] believe that to get a notebook [computer] they have to sacrifice a lot of features. Not with this chip," Yuan said.

"Users have typically had to give up features like page-interleaved memory, direct output drives, EMS 4.0 support in hardware, and memory remapping, when they buy notebook computers," Yuan added.

The controller chip is compatible with Intel's 8237 DMA controller, 8259 interrupt controller, 8254 timer/counter, 82284 clock generator, and the 82288 bus controller, according to ACC.

The chip includes seven DMA channels, three timer/counter channels, 14 external interrupt channels, data buffers, and address buffers.

The ACC-2036 has simultaneous EMS and shadow RAM, as well as simultaneous extended and expanded memory. It has a built-in four-way or two-way page-interleaved memory controller.

The chip will be announced at spring Comdex, and it will begin shipping immediately after the show, according to Yuan.

ACC Microelectronics Corp., 3295 Scott Blvd., Santa Clara, CA 95054; (408) 980-0626.

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Compuadd Introduces Compact 25-MHz 486, Readies Tower Model

Compuadd Corp. has introduced a 25-MHz 486 desktop that takes up 30 percent less space than its prior top model, while delaying its entry into the crowded power server market.

Starting at $4,995, the low-profile Compuadd 425 has three 16-bit and two 8-bit slots with three half-height drive bays. Compuadd plans fast-bus tower models with more expansion options for third-quarter release. Until then, Compuadd is offering the 425 only to corporate accounts.

The system comes with 4 megabytes of RAM, expandable to 8 on the motherboard. IDE storage includes an 80-megabyte hard drive and a choice of 3½-inch or 5¼-inch floppy drive. A VGA adapter and 14-inch color monitor make up the display system. Also included are a keyboard and mouse, one parallel and two serial ports, DOS 4.01, and Windows 3.0. Compuadd offers a 30-day return guarantee and one-year warranty, plus a one-year on-site service agreement.

A Compuadd 425 with a 110-megabyte drive and 1,024-by-768 enhanced VGA adapter with matching color monitor is available for $5,595.

Compuadd Corp., National Sales Division, 12303 Technology Blvd., Austin, TX 78727; (800) 456-3116.

— Patrick Dryden

User-Upgradeable DTK 386SX Laptop To Ship in Summer

By Mark Brownstein

A 386SX laptop that can be field-upgraded without major surgery or returning it to the manufacturer will ship this summer from DTK Computer Inc.

The DTK 386SX laptop computer uses a 386SX processor running at 16 MHz. Unlike most other laptops, a panel located under the removable 84-key keyboard can be lifted out of the unit to expose the system board.

Once the panel is removed, users can install standard 1-megabyte SIMMs or add a 387SX math coprocessor. The system comes with 1 megabyte of RAM, which can be upgraded to 4 megabytes.

The system runs at either 8 or 16 MHz and includes a 640-by-480 page-white VGA display. One 1.44-megabyte 3½-inch drive and a 40-megabyte hard drive are standard, although a version without the hard drive will also be available.

The computer includes one serial and one parallel port, a mouse port, a connection for an external floppy drive, a 16-bit AT card slot, and a slot for a modem card. A keyboard port lets users attach an external 101-key keyboard.

The computer runs on AC power or internal rechargeable batteries. An add-on power pack allows operation for approximately four hours, while internal batteries can power the unit for about 30 minutes, the company said. The laptop weighs 15 pounds including hard drive, modem, and external battery pack.

The DTK 386SX laptop is expected to cost less than $3,500.

DTK Computer Inc., 15711 E. Valley Blvd., City of Industry, CA 91744; (818) 333-7533.

Wang Entering the 33-MHz 386 Server Market

Wang Laboratories recently introduced a 33-MHz 80386 machine to replace its current 25-MHz iteration in LAN file server or multiuser Unix server applications.

An industry standard bus machine, the PC 380/33C comes with one parallel and two serial ports, a keyboard, and an eight-slot chassis — one slot doubles as a 32-bit expansion slot.

A 64K cache memory speeds commonly used instructions to the CPU and an internal 32-bit bus runs at full CPU speed, the company said.

Standard RAM is expandable via single in-line memory modules (SIMMs) to 16 megabytes.

The base unit with 1 megabyte of RAM, one 1.44- or 1.2-megabyte disk drive, and a keyboard lists for $5,995. A version with 4 megabytes of RAM lists for $6,745.

Pricing does not include monitor or operating systems — the machines are suitable for use with MS-DOS, OS/2, Unix, SCO Xenix, Microsoft Windows, or Wang's Clear View environment, according to Wang.

Various integral drive electronics (IDE) hard drives are also available ranging from $500 for 20 megabytes to $2,500 for 200-megabyte version, the company said. Users can also select a 321-megabyte ESDI drive for $3,500.

The systems are expected to ship in June.

Wang Laboratories Inc., 1 Industrial Ave., Lowell, MA 01851; (508) 459-5000.

— Barbara Darrow

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TECH TALK ▪ BY STEVE GIBSON

Free at Last to Discuss Complex Workings of Windows 3.0

Gosh, where do I start? Never in my life has anything chafed at me as much as the non-disclosure agreement I signed with Microsoft over Windows 3.0. Finally, with last week's announcement of this stunning new environment, I'm at liberty to share my thoughts and findings. If I had to do it again, I'm not certain I'd put myself under non-disclosure, but an agreement is an agreement. *InfoWorld's* decision to decline signing up with Microsoft allowed the newspaper to talk freely while I've been mute. Well, I'm mute no more.

Since I'll be writing about the many technical aspects of Windows 3.0 in the following weeks, let's start with a broad overview. I am quite surprised that something as superficial as "window dressing" can be as important and effective as it is. However, everyone who has encountered Windows' new look has come away impressed. The shadowed 3-D appearance is the result of the work of a talented and patient computer graphics artist. Throughout your experience you may find yourself thinking "this is really lovely." I certainly do. Even though detractors will correctly quip that they're just the same old buttons, there's no fighting the feeling that it's fun to press them. Since most of the buttons' functions cause them to disappear as soon as they're pressed, you'll probably find yourself looking for buttons that stay put just so you'll be able to watch them move in and out. *This* is a user interface.

As you certainly understand by now, Windows 3.0 was not created simply because buttons could be made to appear 3-D and be fun to press. Its raison d'etre is its use of protected mode, its own residence in extended memory, its demand-paged virtual memory, and robust multiple virtual DOS machines.

Windows' residence in extended memory means that non-Windows DOS processes running as tasks under Windows 3.0 experience a low conventional-memory overhead of only 9½K. Protected-mode operation allows applications written to run under Windows 3.0 to utilize all of the system's extended memory as well as the huge virtual addressing spaces made available by the 386 and 486 processors. Windows' demand-paged virtual memory allows applications aware of DOS Protect Mode Interface (DPMI) to take advantage of Windows' virtual memory facilities. (More on DPMI later.)

And for today's non-Windows applications, the completely rewritten and amazingly robust multiple virtual DOS machine capability provides multitasking and/or context switching. Whereas the many people who used Windows 386 briefly may have wondered why Microsoft bothered, Windows 3.0 leads you to feel that the bother was worthwhile.

Amid all these positive features and benefits, it's important to appreciate that Windows 3.0 is not without its troubles. In order to adapt itself to the incredible range of possible system capabilities while endeavoring to get the most out of such systems, Windows 3.0 has become quite opaque and complex. Sure it's deep, but it's a very murky depth. Although Microsoft has tried to encapsulate Windows' murky configuration complexity inside the new and tremendously capable Setup facility, our natural propensity for maximizing our systems is frustrated by seemingly arbitrary limitations. Missing from among the many things Windows offers is simplicity.

I believe that with time we'll see the emergence of mature communal lore surrounding Windows 3.0 configuration. The world will arrive at the optimal system configuration that balances cost and performance. We'll be taking a first cut at just such a configuration right here as we discover and configure "Steve's Windows Dream Machine."

The birth of any new platform necessarily involves a painful period from which it either emerges as a less-than-fond memory or as a strong new standard. Although no one would accuse Microsoft of giving birth to a fully grown Windows back in 1983, the current technical ambition and excellence of Windows 3.0 coupled with the growing collection of excellent applications that now exist (and the many more that will soon), squelch any doubt that Windows is here to stay.

We have been dreaming of a future that is largely here today.

Steve Gibson is the developer and publisher of Spin Rite and president of Gibson Research Corp. of Irvine, California. The views expressed are his own.

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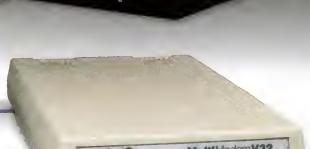

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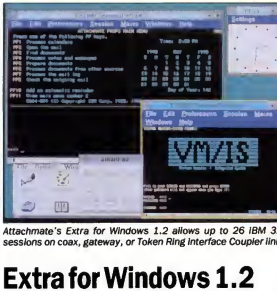


Attachmate's Extra for Windows 1.2 allows up to 26 IBM 3270 sessions on coax, gateway, or Token Ring interface Coupler links.

Extra for Windows 1.2 Uses 3.0 Protected Mode

BY DAVID J. BUERGER

Joining the stream of Windows 3.0 development, Attachmate Corp. announced last week that an upgrade of its micro-to-mainframe 3270 connectivity software will hit the streets in July.

Extra for Windows 1.2 is fully compatible with Windows 3.0's protected mode, said Mike New, Attachmate's vice president of marketing. This lets users run Attachmate's software along with other Windows-compatible and standard DOS applications in the Windows 3.0 protected mode, New said. "This lets users simultaneously run host sessions while using DOS applications, with no communications disruptions."

The $425 product's Windows-specific features include user-sizable screens for each host session, auto font sizing that adjusts screens to display the entire mainframe screen in a window, and pop-up graphical keypads that allow execution of programmed function keys with a mouse click.

Extra for Windows 1.2 supports up to 26 simultaneous mainframe sessions, IndiFile file transfer, CUT and DFT coax links, Attachmate or IBM gateways, and IBM Token Ring Interface Coupler connections, according to Attachmate.

Version 1.2 is compatible with older versions of Windows, the company said.

Attachmate Corp., 13231 S.E. 36th St., Bellevue, WA 98006; (206) 644-4010.

DCA Upgrades Its 10Net OS, Crosstalk for Windows

BY PATRICK DRYDEN

10Net users eyeing new Windows 3.0 can look forward to an upgrade in July supporting its network-aware enhancements, while Crosstalk for Windows should be compatible this month, according to Digital Communications Associates (DCA).

Version 4.20 of 10Net Plus LAN OS, in beta testing since the end of April, will include a feature called 10Windows as part of DCA's graphical user interface goal for current and future products.

10Windows supports the Windows spooler so users can capture and save network print status messages in one window. System monitor messages from 10Net servers appear as icons instead of status lines.

Screen-to-screen chatting improves under the Windows interface as well, allowing a user to converse with one or more users or groups simultaneously. The current version limits users to sequential, one-on-one chatting.

Scheduled for July shipment, 10Net Plus LAN OS 4.20 costs $195 and upgrades are $49.95.

Crosstalk for Windows, Version 1.1 adds support for the COM 3 and 4 ports, plus Windows 3.0 features such as the help system and new Dynamic Data Exchange (DDE) functions.

Expected by the end of May, Crosstalk for Windows, Version 1.1 costs $195 and the upgrade is free.

Digital Communications Associates Inc., 1000 Alderman Drive, Alpharetta, GA 30201; (800) 241-4762.

E-Mail Utility Translates File Formats

Allows Exchange of Word Processing Documents Between Programs

BY YVONNE LEE

Consumers Software Inc. has announced it is offering a utility package that, when combined with its Network Courier E-mail software, will make it easier for users to exchange editable word processing documents, regardless of which program created them.

The company will distribute a special version of the Network Courier that integrates Keyword Technology's document interchange product, Keypak. The integrated product, called Network Courier Pak, will automatically translate file formats when users save documents to their computers.

For example, a Microsoft Word user can send documents to a Word Perfect user, who receives the file as a Word Perfect document. When the second user edits the document and mails it back to the first, the initial user can receive it as a Word document.

The Network Courier Pak can provide interchange between any of 35 different systems, including Displaywrite 4, Microsoft Word, Multimate, and Word Perfect.

The Network Courier Pak, which includes the Network Courier LAN E-mail software and three document translation formats, is available for $2,490 per server.

Consumers Software also announced that its Network Courier for Windows 3.0 would be available by May 28 for $995 per post office.

Consumers Software Inc., 73 Water St., 7th Floor, Vancouver, British Columbia V6B 1A1; (604) 688-4548.

Da Vinci E-Mail For Windows 3.0 Features DDE

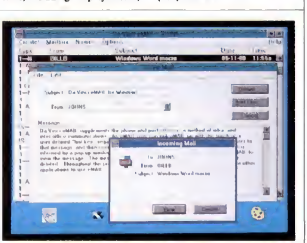
BY MARGIE WYLIE

Da Vinci E-mail users can now send messages from within Microsoft Word and Excel with Da Vinci Systems' Windows 3.0 version, the company said.

The new version ships with two Dynamic Data Exchange (DDE) macros that let users send Excel reports and Word for Windows documents as E-mail, according to Chris Evans, vice president of marketing.

DDE is Microsoft's message routing service designed to let Windows and OS/2 applications swap data.

To send a message from either Excel or Word for Windows, users simply select a command from a pull-down menu from within the application, Evans said. The macro pastes the text to the Windows or OS/2 Clipboard, and sends out a DDE message that instructs the E-mail software to send the Clipboard's text as a message, he said.



Da Vinci E-mail for Windows 3.0 lets users send text from Microsoft Word and Excel documents as mail messages.

The new version also brings Da Vinci's look and feel in line with standard Windows format and takes advantage of Windows 3.0's standard on-line help facilities.

The Windows 3.0 version of Da Vinci E-mail works on all popular LANs and is available now. It costs $445 for an eight-user version, and $1,145 for a 100-user server license. Registered owners can upgrade for $95.

Da Vinci Systems, P.O. Box 17449, Raleigh, NC 27619; (919) 781-5924.

TECHNOLOGY UPDATE

Mac Plays Important Networking Role

3270 Connectivity Options Are Often Identical for Macintoshes, PCs

BY DAVID J. BUERGER

Macintosh enthusiasts will quickly scorn the claim by some pundits that the Mac will diminish in popularity due to the advent of Microsoft's Windows 3.0. But whatever its ultimate future, there are a lot of installed Macs. The Macintosh will continue to play an important computing role — whether that be as an individual workstation or as a front-end to corporate mainframe applications.

Apple Computer Inc. has been trying, recently, to change a deeply ingrained perception among MIS managers that the Mac is difficult to integrate with an IBM environment. In reality, most 3270 connectivity options for PCs and PS/2s have long existed for Macs.

Perhaps the simplest link is asynchronous. The Mac user dials out with communications software and a modem to a port on an IBM 7171 or equivalent front-end processor that channel attaches to the mainframe. The Mac attaches to the host on an as-needed basis, typically to use E-mail, transfer files, or access a host application.

The most popular 3270 connection scheme for Macs is identical to what MIS has done for PCs: 3270 terminal emulation and file transfer via a direct coaxial link. Its most common incarnation is to stick a 3270 emulation card in a Mac SE (or later version). The Mac also runs 3270 emulation software, which makes it look and act like an IBM 3278 Type 2 terminal.

Some of the most popular Systems Network Architecture card/software products include Hopkinton, Massachusetts-based Avatar's Macmainframe, and Alpharetta, Georgia-based Digital Communication Associates' Mac Irma.

See Mac, Page 37

CONNECTIONS ■ BY DAVID BUERGER

Windows 3.0 Will Open Up Mainframe Platforms to LANs

As the dust settles from the Windows 3.0 announcement, it's a good time to ask what this product means to enterprise networking.

InfoWorld's special Windows supplement does a great job of introducing its benefits, especially on a LAN. I'd like to explore further the potential contribution of Windows 3.0 toward integrating PCs on LANs with minicomputers and mainframes.

THE MESSY REALITY. The reality of enterprise networking today is a messy situation. To their credit, vendors have made positive strides by creating products that let PCs link to specific mini and host platforms.

But little has been done to simultaneously link PCs with multiple hosts that run different protocols. For example, it's now common to find PCs linked to IBM mainframes, DEC minicomputers, or Unix-based hosts. But it's virtually impossible to have links to all of them at the same time.

This requirement isn't usually important to small companies, but it will become crucial for mid-to-large-size organizations. Larger companies historically have different host systems for specific applications. IBM is often used for database and administrative systems, DEC for engineering applications, and so on.

Despite zealous optimism about downsizing to PC LANs, these large systems and their applications will be with us for a long time. Not only is the conversion cost too high, but many high-end applications run better on a mainframe.

Simultaneous access to applications on different host architectures will become ever critical as organization structures flatten. Ad hoc workgroups pulled from different parts of a company will need to cull vital information from different systems. The network technology required for such queries will quickly outgrow today's compartmentalized connectivity schemes.

WINDOWS AND MULTIPLE PROTOCOLS. Windows 3.0 has the capability to be the glue that simultaneously integrates DOS-based PCs with applications on different host architectures. The key is its memory management.

All of us have experienced the problems of "RAM cram" on DOS-based PCs, especially on networks. Protocol memory requirements for just one network often prohibit running memory-intensive applications. Convoluted tactics such as loading drivers into high memory, using expanded memory, or hardware devices like the All Charge Card on 286 PCs have convinced many network managers that DOS is dead.

Windows 3.0's memory management changes this perception and potentially will prolong the life of DOS for many years. The new Windows lets you run both Windows and DOS applications in the 286 and 386's protected mode. All you need to let Windows manage these applications is a couple of megabytes of extended memory.

The PC's 640K of "real memory" is used for things that used to be a bother. DOS requires about 60K, and the Windows 3.0 kernel needs roughly 45K. The balance of over 500K can be used exclusively for network protocols such as IPX, Netbeui, TCP/IP, and ISO TP-4.

This also is where you load interprocess communications (IPC) protocols such as Named Pipes, Netbios, and IBM's Advanced Program-to-Program Communication (APPC) — essential elements to distributed applications.

New standards for letting multiple protocols simultaneously work through a single network adapter card are now being used by the industry's major players. The most widely adopted standard (by IBM, DEC, 3Com, etc.) is the Network Driver Interface Specification (NDIS). NDIS allows you to run a maximum of four protocols on such network adapters as 3Com's 3C503 Ethernet or IBM's Token Ring card. Novell is pushing a functionally similar specification called Open Data-Link Interface (ODI) for Netware 386.

The system I've just described will let you attach to any host you want without worrying about loading and unloading protocols. Prior solutions often required you to either reboot your PC before loading a new protocol, or buy a $1,200 network adapter that kept the protocols loaded on board.

An optional approach would be to run a protocol stack in one window and put the interrupt handler or device driver in real memory.

WHAT THE FUTURE HOLDS. The idea of running protocols locally is a systems design choice. It contrasts with the gateway philosophy, in which a communications server such as Microsoft/DCA's OS/2-based product (due to ship in a month or so) provides mainframe links on a demand basis.

While the gateway approach is fine for situations where users only require occasional host links, its main pitfall is that it is a single point of failure. If the gateway goes down, so do host links for everyone on the network. This could be too risky when distributed applications and multi-host connectivity are constantly required by everyone.

Running network protocols locally conforms to IBM's design philosophy underpinning OS/2 Extended Edition's Communication Manager. IBM's scheme requires all PCs to run Extended Edition to supply network protocols needed for Systems Network Architecture mainframe connections.

The use of Windows 3.0 with a product like Network Software Associates' APPC for DOS cuts out the need for Extended Edition. This 150K IPC gives you the benefits of APPC-based distributed applications without junking DOS.

Properly implemented, Windows 3.0 will also cut out the need for expensive multiprotocol network adapters and fancy memory cards. Windows 3.0 will work with the cheapest extended memory you can buy.

Windows 3.0 will also simplify network architectures. 3Com's Demand Protocol Architecture on LAN Manager, for example, swaps protocols locally to preserve memory for DOS applications. Windows 3.0's new memory management will give the same benefits on all networks.

And from a network integrator's perspective, Windows' support of Dynamic Data Exchange (DDE) between Windows applications will unlock new possibilities for network application development with existing software.

Windows 3.0 is the most exciting tool to appear in years for solving real-world enterprise connectivity problems. The benefits of integrating network applications under a common graphical interface are attractive. The benefits of tying existing enterprise computing resources together with one inexpensive software tool are downright irresistible.

Windows 3.0 can be the glue that integrates DOS-based PCs with applications on different host architectures.

Windows 3.0 is the most exciting tool to appear in years for solving real-world connectivity problems.

David J. Buerger is Executive Editor/Networking at InfoWorld. E-mail comments are welcome: Internet, dbuerger@cup.portal.com or MCI Mail, 304-0160 (start the subject line with [DE2PDB]buerger!). The views expressed are his own.

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FEBRUARY 12, 1990

16MHz 386SX-BASED PCs	OVERALL WEIGHTED SCORE
Dell System® 316	1
Compaq Deskpro 386S	2
Everex Step 386/s	2
IBM PS/2 Model 55SX-061	4

PC WEEK POLL OF CORPORATE SATISFACTION
APRIL 10, 1989

20MHz 80386-BASED PCs	OVERALL WEIGHTED SCORE
Dell System 310	1
AST Premium/386E	2
Compaq 386/20e	2
HP Vectra RS/20 PC	4
IBM PS/2 Model 70-121	5

PC WEEK POLL OF CORPORATE SATISFACTION
FEBRUARY 5, 1990

25MHz 386-BASED PCs	OVERALL WEIGHTED SCORE
Dell System 325	1
HP Vectra RS/25C	2
AST Premium 386/25	3
Everex Step 386/25	3
Compaq Deskpro 386/25	5

PC WEEK POLL OF CORPORATE SATISFACTION
OCTOBER 24, 1988

386-BASED PCs	OVERALL WEIGHTED SCORE
Dell System 386/16 (PC's Limited)	1
Compaq Deskpro 386 Model 40	2
Zenith Model Z-386	3
IBM PS/2 Model 80	4
WYSEpc 386 Model 3216	4

PC WEEK POLL OF CORPORATE SATISFACTION
APRIL 17, 1989

80286-BASED PCs	OVERALL WEIGHTED SCORE
Dell System 200	1
CompuAdd 286/12	2
Acer 900	3
Compaq Deskpro 286 Model 1	4
HP Vectra ES/12 PC	4

PC WEEK POLL OF CORPORATE SATISFACTION
OCTOBER 17, 1988

286-BASED PCs	OVERALL WEIGHTED SCORE
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AST Premium/286	2
Compaq Deskpro 286	3
Zenith Model Z-286	3
IBM PS/2 Model 50	5

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Murata Readies PC/LAN Fax System For Spring Comdex

BY PATRICK DRYDEN

A new fax machine with PC interface and software for local or LAN users from Murata Business Systems doubles as a scanner and backup printer for the network, while remaining available for normal stand-alone fax operation.

Scheduled for a Spring Comdex introduction, the versatile PCF 9 system links serially to any single-user PC or nondedicated LAN station, as well as midrange and mainframe hosts.

A 14K module resides in memory at the connected PC, providing the same interface as foreground fax software run by LAN users. Host systems control fax functions by a command interface.

Murata designed its software to run from a shared directory on any DOS network, said Mike Few, applications engineer. Scanned image files and incoming fax files reside there for routing by a fax administrator.

The common dialing directory supports 999 entries, including group lists. Graphic support allows fast image display and rotation, plus translation between fax file format and TIFF, .PCX, Postscript graphic, and HP PCL.

The Group 3 fax machine offers an expandable 62-page internal memory for out-of-paper reception and outbound group transmissions, a 335-number autodialer, and a port for connecting an HP Laserjet or compatible printer.

Scheduled to ship in June, the PCF 9 will cost $2,995, said Gary Greer, director of product development.

Murata Business Systems, 5560 Tennyson Parkway, Plano, TX 75024; (214) 403-3300.

Session/XL Update Will Simplify User Interface, Scripting

Triton Technologies last week updated the scripting language to its CO/Session communications packages for modem transfers and remote control among stand-alone or networked PCs.

Session/XL, Version 2.0 simplifies the user interface with menu customization and a file transfer scheduler, adds more sample scripts, and allows DOS commands and batch file execution from within job files.

Session/XL now supports up to eight input and output files; variables for file time, date, and size comparison; plus error detection and logging to continue a process through embedded condition checks.

Scheduled for release on May 25, Version 2.0 costs $95; upgrades are $50. Session/XL requires a PC with DOS 2.0 or later; asynchronous modem or serial link, from 300 to 57,600 bits per second; plus CO/Session or CO/Session LAN as the remote PC or network station.

Triton plans an interface to give C or assembler programmers direct access to Session/XL driver commands. Scheduled for a July release, the API will cost $995 and include one year of technical support.

Triton Technologies, 200 Middlesex Essex Turnpike, Iselin, NJ 08830; (201) 855-9440.

— *Patrick Dryden*

Rumba 3.0 Brings in Data From Mainframe Reports

Wall Data Inc. has unveiled a Windows 3.0-compatible version of its micro-to-mainframe 3270 connectivity package that lets users create links to automatically bring in updated data from applications on IBM mainframes.

Christened Rumba 3.0, the program lets users of PC applications select and copy data from a mainframe report and then, using something like Excel's paste link option, directly link the mainframe report to a spreadsheet.

Besides the hotlink capability, Rumba 3.0 has a feature called "hotspots" that lets users activate typical 3270 functions or run Rumba custom macros.

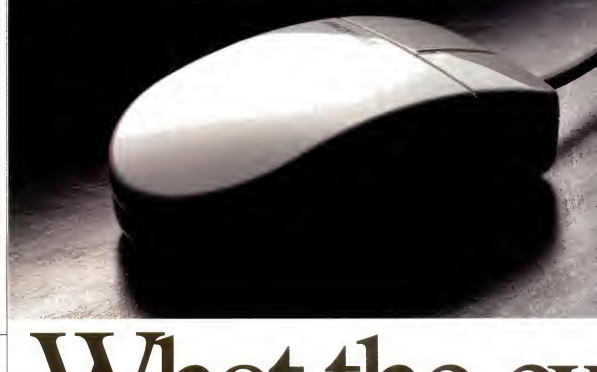
Rumba 3.0 acts as a true Windows 3.0 application by taking advantage of all three of its modes — real, standard, and 386 enhanced. Rumba 3.0 is the only program that offers multiple sessions in all memory configurations, according to company officials.

Other highlights of the improved version include printer and terminal emulation, which makes it possible to direct mainframe printouts to PC-based printers. Wall Data also has moved its context-sensitive help for Rumba 3.0 under the Windows 3.0 help manager.

Available now, Rumba has a suggested retail price of $595. Free upgrades from previous versions of the program are available until December 31. After that date, upgrades will cost $50.

Wall Data Inc., 17769 N.E. 78th Place, Redmond, WA 98052-4992; (206) 883-4777.

— *Ed Scannell*



What the ex
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SMC and IMC Roll Out 10Base-T Cable, Adapters

While Standard Microsystems Corp. (SMC) plans to join the 10Base-T ranks officially at Comdex, IMC Networks Corp. last week released its support for Ethernet on unshielded twisted-pair cable.

IMC Networks added a twisted-pair port card for its PC-Nic Basket multimedia, multiport repeater and shipped three new PC-Nic TP cards.

The 16-bit cards with 64K buffer cost $350 for AT-bus or $375 for Micro Channel-bus PCs, with 16K models of each available for $25 less. An 8K PC-bus card costs $275 and can fit some laptops or compact diskless stations, the company said.

Available now, PC-Nic TP cards include drivers for Netware 286/386, PC-Nic TCP/IP, and PC-NFS.

SMC will introduce next week at Comdex its 3508TP concentrator with eight RJ45 ports and one AUI port for $1,195, according to Steve Schmid, SMC product manager.

The 16-bit AT-bus 3016TP will cost $495 and 8-bit 3008TP will cost $395. Drivers support Netware 286/386, Netbios, and TCP/IP.

The concentrator and 16-bit card should ship by July, with the 8-bit card following by August, Schmid said.

IMC Networks Corp., 1342 Bell Ave., Unit 3E, Tustin, CA 92680; (714) 259-1020.

Standard Microsystems Corp., 35 Marcus Blvd., Hauppauge, NY 11788; (516) 273-3100.

— Patrick Dryden

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Making it all make sense

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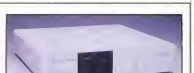


The Codex 3600 analog/digital modem

Two Codex Modems Enable Analog Users To Use Digital Lines

Users of leased-line analog modems who want to capitalize on falling digital line prices can now upgrade with two Codex modems.

The 3500 Digital Service Unit/Channel Service Unit (DSU/CSU) operates at 2.4, 4.8, 9.6, 19.2, and 56 kilobits per second over AT&T's DDS-I and DDS-2 services. The base version, available in June, will cost $695. The $1,095 network-managed version, compatible with Codex's 9300 or 9800 systems, will follow.

The 3600 is a generic unit that can be configured as an analog or digital device, said Bob Clinton, director of transmission marketing. In its digital guise, it costs $2,000 to $3,000 and achieves transmission speeds of 2.4, 4.8, 9.6, and 19.2 kbps.

The analog iteration, which costs from $3,000 to $5,000, can transmit at speeds up to 24 kbps, the company said. It is backward compatible with existing 2600 units. Those 2600 users who want to migrate can buy a hardware and software update for $895, Clinton said.

Codex Corp., 20 Cabot Blvd., Mansfield, MA 02048; (508) 364-2000.

— Barbara Darrow

Mac

Continued From Page 33

The host link is activated by attaching a coaxial cable to the card. The cable runs to a standard local or remote IBM cluster controller, which in turn runs to a front-end processor or communications controller that is channel attached to the IBM mainframe.

This time-tested method is reliable and makes good sense in an environment where a few Macs are mixed with other PC platforms.

In situations where Macs are networked with Appletalk, Ethernet, or Token Ring connections, it probably makes sense to use a gateway. According to Santa Clara, California-based Tri-Data Systems Inc., over half of networked Mac-to-mainframe gateways use its own Netway product.

The Netway 2000 acts as a bridge and router to let networked Macs in all three topologies link to an IBM mainframe. The Netway box replaces the standard IBM 3174, 3274, or 3276 control unit, which in turn links to the mainframe's front-end processor. A recent update also lets PCs on the same LANs use the Netway for gateway access to the host.

If you need to link Macs with Digital Equipment Corp.'s world of DEC-Net and the VAX, other gateways exist. These include Appletalk and Ethernet links using software from Pacer Software Inc. of Westboro, Massachusetts; Alisa Systems Inc. of Pasadena, California; and Odesta Corp. of Northbrook, Illinois.

Whatever your situation, gateway tools exist to make Macs full-fledged members of any IBM or DEC environment.

Your wish is our Commander.

In your wildest dreams, if you could do absolutely anything you wanted with your data files, what would you do?

You'd want to organize them, of course.

Manage them, too.

From time to time you'd probably need to look for them.

But most of the time, you'd just want to look *at* them—or through them—instantly.

Occasionally you might even want to send them to someone else so they could look at them, too.

Or transfer them to your laptop so you could play with them at home. Or away from home.

Naturally, you'd want to be able to do all of these things without having to do much of anything yourself.

Maybe pull down a menu, hit a couple of keys or nudge your mouse every so often.

Seeing is relieving.

Well, stop dreaming. Because the new Norton Commander® has arrived and it's better than anything else you can use to deal deftly with DOS.

In fact, the new Norton Commander is so good, it's even better than the old Norton Commander.

Which is pretty remarkable, considering that *InfoWorld* called the original version "tops in its class…a new level of convenience for MS/DOS users."

They called Version 2.0 "a near-perfect DOS shell…the market's best…recommended for all DOS users, regardless of expertise."

We can't wait to see what the critics will say about our latest version.

And neither should you.

Now you see it.
Now you don't have to.

The new Norton Commander combines all the functions of a hard disk manager with all the features you need to support and enhance the DOS command line.

Yet it's flexible enough to adjust totally to your particular style of working—even get out of your way entirely when you don't need to see it.

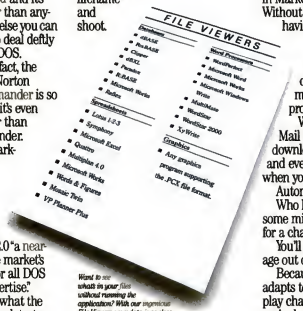
Near-Perfect DOS shell Emerges as Market's Best

InfoWorld thought the world of Version 2.0. The new Norton Commander is even better—and even easier to learn and use.

But since it can do so many things for you, you'll probably be seeing a lot of it.

Like those times when you want to browse through the contents of your files, but you haven't the time—or the patience—to load and run the applications that created the files in the first place.

Thanks to our ingenious File Viewers, all you have to do now is point to the filename and shoot.



Want to see what's in your files without running the applications? With our ingenious File Viewers, your data is as close as a keystroke. Version 3.0 supports most leading business applications.

Presto, you're eyeballing your data.

Fire again and you've launched the application.

In fact, a couple of keystrokes—or mouse-strokes, if you prefer—is all it takes to perform the full range of file management functions.

Or, for that matter, to call up a tree view of your directories, a list of your last 15 commands, or a menu of your favorite programs and routines.

What could be easier? Faster? More efficient?

Certainly nothing we've heard of.

Armed with the fax.

Speaking of things you haven't heard of before, imagine using a DOS manager to send faxes to any of the world's 4,000,000 or so fax machines.

Dream on, right?

Wrong. Our new Commander Mail™ not only lets you do that, it lets you instantly exchange files, telexes and E-Mail with any MCI Mail® subscriber—in Milwaukee, in Mongolia, even in Marketing.

MCI

With just a couple of keystrokes, our new Commander Mail lets you instantly exchange files, telexes and E-Mail with any MCI Mail subscriber. And you can fax to any machine in the world.

Without having to laboriously load and run one of those complex communications programs.

The new Norton Commander speaks laptop, too. It adapts to your LCD display automatically. And our new Commander Link makes it easy to transfer files between two systems.

What's more, Commander Mail checks your E-mailbox, downloads messages to your disk and even beeps to let you know when you have a message.

Automatically, of course.

Who knows, you may actually get some mileage out of your modem for a change.

You'll definitely get more mileage out of your laptop PC.

Because the Norton Commander adapts to your laptop's LCD display characteristics.

And our new Commander Link™ lets you transfer files from desktop to laptop—and back—quickly and easily.*

So before you go back to dealing with DOS the hard way, see your favorite software dealer.

If you haven't got a favorite software dealer, call us right away at **1-800-365-1010.**

And order us around.

Peter Norton COMPUTING

Designed for the IBM PS/2 and PC families and 100% compatibles. © 1989 Peter Norton Computing, Inc., 100 Wilshire Blvd., 8th Floor, Santa Monica, CA 90401-1146. All rights reserved. All trademarks are acknowledged.
*Requires a serial cable. Coupon offer for cable is included with package.

MACINTOSH NEWS

PRODUCT PIPELINE

● MONITORS

SIGMA DESIGNS UNVEILS MULTI-RESOLUTION DISPLAY. Sigma Designs Inc. recently announced a 19-inch monochrome monitor for the Mac II family that allows users to switch between six different screen resolutions on the fly. Using either the Mac Control Panel or a user-definable combination of keystrokes, users can use the display, called the L View Multi-Mode, to view documents in 36-, 46-, 60-, 72-, 92-, or 120-dot-per-inch resolutions. The monitor, along with its video board, will sell for $1,999 and is expected to be available by the end of the month. (415) 770-0100.

● VIDEO CAPTURE

MASS MICROSYSTEMS OFFERS FRAME-GRABBER CARD. Mass Microsystems recently announced the Quick Image 24 frame-grabber card, which instantly captures NTSC or PAL video frames at one-thirtieth or one-twenty-fifth of a second. The $995 Nubus card is compatible with all Mac II slots and accepts input from any composite or S-Video source such as video cameras, cassette recorders, and videodisc players. Depending on the size and color of the Mac monitor, video can be viewed in five, 15, or 30 frames per second, although screen capture will be instantaneous in any mode. (408) 522-1200.

● UTILITIES

ADVANCED SOFTWARE ADDS COLOR TO DOCUCOMP. Advanced Software Inc. has updated its Docucomp document comparison utility to include color support and several new technical writing tools. Docucomp 1.5 offers color display, printing, and saving, as well as "find..." and "go to line number" features for improved navigation. Other added features are reading options, a choice of revision bars, the option to omit deletions, and the capability to read More II and 3.0 files and those of several popular Macintosh word processors. The retail price will $159.95, and users can upgrade for $19.95. (408) 733-0745.

● DATABASES

CHANG SHIPS CAT III. Chang Laboratories Inc. recently started shipping a major update of its CAT relational database software for contact management. CAT III has a more integrated look, a full-function word processor for doing form letters, and a new interview program. The program's price jumped from $395 to $495 with this revision. (408) 727-8096.

SYSTEM 7.0

With So Much There, Where Do You Begin?

New Mac OS Offers Large, Small Changes

BY ERIC LACH

There are so many new features and changes in System 7.0 — Apple's most important rewrite of its system software since 1984 — that many users are going to find it a daunting task to try to understand them all.

On the one hand, there are the small changes.

The Trash Can on the desktop will now only be emptied when the Empty Trash command is executed. Also, a window won't become active until a user clicks the mouse button, and then releases it.

What's the point of such tweaks, you wonder?

Well, if you have to ask, you obviously never tried to retrieve a file from the trash after it was inadvertently emptied by the launching of an application or rebooting. Evidently, you have never played hide-and-seek with a window that keeps disappearing every time you try to drag a file into it.

On the other hand, there are the whole new categories of functionality.

One such category is Interapplication Communication. This architecture, when it is finally implemented by applications developers, will allow Macintosh programs an unprecedented amount of communication and cooperation with one another.

For users and developers faced with climbing the learning curve for System 7.0 there is, however, one small comfort: What we are seeing now is apparently what we will get.

After months of speculation about what might be added to or deleted from the operating system, Apple has finally shown the world exactly what will be in System 7.0. Consequently, users should be assured that whatever time and effort they invest in learning about System 7.0 today will not later turn out to be wasted.

So, with so many changes — large and small — where does one begin?

Apple officials say users and developers should focus their attention on the following six core technologies:

- A more intuitive and powerful Finder, called Version 7.0.
- Apple's True Type outline font technology.
- Virtual memory.
- A new scheme for sharing files over an Appletalk network called Macintosh Fileshare.
- Interapplication Communication.
- A standard way to access remote host databases called the Data Access Manager.

Users will benefit immediately upon exposure to the first four technologies, said Steve Goldberg, product manager for System 7.0. The last two — Interapplication Communication and the Data Access Manager — will have to be implemented by developers in their applications before users can take advantage of them, he said.

In the coming weeks, we will look more closely at these and other aspects of System 7.0. □

Next week: Finder 7.0, and other interface changes.

Program Will Allow Macs To Easily Read DOS Disks

Competes With DOS Mounter on Features

BY ERIC LACH

Insignia Solutions Inc., maker of the Soft PC emulation software line, is now readying for release a Macintosh program that can read DOS disks from a wide range of drives, including Apple's Superdrive, and create desktop files that allow folders and documents to appear as icons on the Mac desktop.

The product, which is codenamed Wizard, is designed to compete directly with Dayna Communications' DOS Mounter, but will offer many capabilities not available on that package, according to Paul Rosenfeld, the company's director of Macintosh sales and marketing.

One of the the chief technical advantages of Wizard is that, unlike DOS Mounter, the program doesn't automatically write Macintosh desktop information to the DOS disk, said Paul Kerr, a technical evangelist for Insignia. Instead, the program creates a desktop file in RAM and only writes that data to disk when the DOS files are copied.

Because DOS Mounter must write to disk, the program cannot read full disks, some disks with copy protection schemes, and locked disks, said Kathy Curtis, a spokewoman for Dayna.

Wizard, on the other hand, can read all such disks, Kerr said. This is particularly useful, because some copy-protected disks can be permanently corrupted by DOS Mounter, making the original unusable after it has been read.

In addition, Wizard, which does not use the Apple File Exchange, reads DOS disks at speeds closer to those of regular Mac disks, Insignia officials said. Typically, Wizard will mount a DOS disk in two to three seconds, compared to the 60 to 65 seconds it can take DOS Mounter, Kerr said.

Wizard also works with a much wider range of drives than DOS Mounter, Kerr said. While DOS Mounter operates only with Apple's 5¼- and 3½-inch Superdrive floppy drives, Insignia's software supports the Superdrives as well as Apple's 5¼-inch floppy drive and PLI's Turbo Floppy line of 5¼- and 3½-inch drives. Wizard can also handle DOS files received over a network.

Insignia plans to launch a whole line of products based on Wizard and Soft PC, its program for allowing DOS applications to run on the Mac, Kerr said. "Wizard is designed to give you access to DOS disks in the Finder, while Soft PC allows you to run DOS applications. What Wizard can't do is let your Mac run PC applications, though Wizard and Soft/PC will work together closely to do that."

One product now being developed at Insignia will allow developers to "sugarcoat" their DOS applications with a graphics layer, giving them a more graphic look on the Mac. "This will allow vertical market developers who want to come out with a Mac version, but don't have the money to redo it from scratch, to just add a Mac shell to their DOS applications," Kerr said.

Wizard, which is scheduled for release on July 15, will sell for $89.95 for three months and then go up to $129.95, according to Rosenfeld.

Insignia Solutions Inc., 254 San Geronimo Way, Sunnyvale, CA 94086; (408) 522-7600.

Color Scanning, Separation Systems Arrive on Desktop

BY NICO KRONN

Full-color printing — once considered too costly for small publishers — is now becoming more affordable with new desktop color scanning and separation systems.

Systems such as Barneyscan Corp.'s CIS 4520 and Nikon Inc.'s LS-3500 are bringing high-quality color scanning and color separation to the desktop for under $30,000.

Barneyscan's recently introduced $27,995 CIS 4520 system scans 35mm, 2¼-inch, and 4-by-5-inch mounted and unmounted transparencies and film strips at 2,592 dots per inch (dpi).

Each image is scanned into a Mac II with Barneyscan's system, users can alter color, brightness, and contrast, as well as crop images using image processing software that comes with the system. The software lets users retouch images, and blur, sharpen, or erase pixels.

Calibrated color separation software lets users reduce color casts and adjust images according to the types of ink, press, and paper that will be used.

Nikon's LS-3500 scanner costs $9,995 and scans 35mm slides at 4,388 dpi. Once scanned, images can be separated for color printing with a $750 software package that allows users to adjust color, brightness, and contrast. The scanner works with Mac IIs and 386-based PCs.

A color scanner, called JX-600, developed by Sharp Electronics Corp. scans at 600 dpi. While this is much lower than Barneyscan's or Nikon's, it can handle transparencies up to 11 inches by 17 inches, including multiple slides at once. The $14,995 system does not come with image processing or color separation software.

Robert Virkus, president of Micromedia, an electronic publishing consulting firm in Montclair, New Jersey, says that most people are satisfied with the quality of such low-end systems. "For a lot of people, high-end quality is overkill," Virkus said. Low-grade paper and 85-line screens don't justify the cost of high-quality color separations.

Barneyscan Corp., 1125 Atlantic Ave., Alameda, CA 94501; (415) 521-3388.

Nikon Inc., Electronic Imaging Products, 623 Stewart Ave., Garden City, NY 11530; (516) 222-0200.

Sharp Electronics Corp., Sharp Plaza, Mahwah, NJ 07430; (201) 529-9500.

UNIX NEWS

PRODUCT PIPELINE

SPREADSHEETS

WINGZ FOR SUN AND NEXT SHIPS. Wingz, the graphical spreadsheet from Informix, is now shipping in workstations from both Sun Microsystems and Next Inc. The Sun version uses the Open Look graphical user interface, while the Next version uses the Next Step interface. (415) 926-6300.

ENVIRONMENTS

A/UX 2.0 TO BE AVAILABLE IN JUNE. Apple's A/UX 2.0 will begin shipping in June. The product will cost $795 in a CD ROM version, or $995 for a tape or floppy disk version. (408) 974-1578.

MIPS LICENSES PORTABLE NETWARE. MIPS Computer Systems Inc. has licensed Novell Inc.'s Portable Netware for porting and resale on systems using the MIPS RISC chip family. The new software will integrate print and file services for MS-DOS, Mac, OS/2, and Unix network environments. The two companies plan to conduct joint marketing of the MIPS version of Portable Netware. MIPS: (408) 524-7164.

COMMUNICATIONS

EQUINOX TO RELEASE UPDATED MEGAPORT-24 SOFTWARE. Equinox Systems Inc. has upgraded the software for its 24-channel serial communications board, the Megaport-24. Release 2.0 permits up to eight boards, serving a total of 192 users, to be attached to a 386- or 486-based system. A new hotkey feature enables a user at a terminal to instantly switch between different sessions with the help of a designated key, which allows two programs to be accessed simultaneously. The upgrade is available free to existing customers, and will ship in early June. The company also announced that its Megaport-24 board is now available for MIPS computer platforms, priced at $2,495. (800) 328-2729.

ON-LINE SERVICES

SUPREME COURT DECISIONS COME ON LINE. The Supreme Court of the United States will begin distributing its decisions electronically next month, using UUNET Communications Services as its gateway to the computer community. Anyone with a computer using UUCP can call up the Supreme Court opinions at (900) GOT-SRCS for 40 cents per minute. UUNET ties the Supreme Court to more than one million Usenet and Internet users, and over 600,000 Compuserve users. (703) 876-5050.

Interleaf Shows Slim TPS Basics For Workstations

BY ED SCANNELL

Interleaf Inc. has unwrapped a scaled-down version of its publishing software program for Sun Microsystems Inc.'s workstations. The program requires only about half the hard disk memory needed by previous versions.

Aimed at users looking for single-seat publishing solutions, Interleaf's Slim TPS Basics integrates word processing and graphics, and features data-driven charting, an equations editor, and an automated page layout facility. A small database is built into the package so users can automatically pull together multiple versions of a document.

The program, which works with Postscript printers, comes bundled with Laserwriter Plus fonts. Documents that users create with Slim TPS Basics can be exchanged with other Interleaf documents.

The package accepts data from almost any other software program, ranging from spreadsheets to CASE programs, company officials said. Slim TPS Basics, which runs on the Sun/3 and Sparc lines, including the latest Sparc-Station SLC, will work with Open Look in future versions.

Most users can install Slim TPS Basics themselves, company officials said. It comes with a set of tools including an on-line demonstration and tutorial. Users can request a free trial version of the program; the real thing costs $795.

Interleaf Inc., 10 Canal Park, Cambridge, MA 02141; (617) 577-9800.

Interleaf's Slim TPS requires only half the memory of previous Sun versions.

Samsung Introduces X Window Terminal

BY MARTIN MARSHALL

Samsung has signaled its intention to enter the growing X Window graphics terminal market, exhibiting a prototype RISC-based unit at last week's Xhibition conference in San Jose, California.

The Samsung SGS-19 is a 19-inch monochrome X terminal that is designed around an AMD 29000 RISC processor. Although exhibited at the show, it will not be available to end-users until the fourth quarter. Samsung demonstrated the unit to attract OEM vendors, according to Alex Valentine, manager of product/market planning for Samsung Software America.

The terminal uses Samsung's MU9511 high-resolution monitor, providing 1280-by-1,024 resolution with a 66 Hz non-interlaced screen refresh rate. It has 256K of video RAM, 2 megabytes of RAM on the motherboard, and two slots for SIMMs using either 1- or 4-megabit DRAM chips.

The X Window software that will be bundled with the terminal was developed by AGE Inc. of San Diego, California, and is a complete implementation of Release 4.0 of MIT's X11 System. It does not have a virtual memory capability like the Micronics Fast Term that was also introduced last week (see "Fast X Window Terminal Has Virtual Memory," May 21, Page 41), but it does have a robust failure recovery system, and fast "save under" and "backing store" functions, according to Samsung.

The terminal also has built-in thick- or thin-Ethernet support, as well as a serial line connector for SLIP, TFTP, and Telnet sessions.

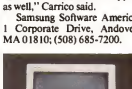
The SGS-19 is aimed to compete directly with Network Computing Devices' NCD-19. It claims an MIT Xstone benchmark performance of nearly 54,000 Xstones, more than twice the performance of the NCD-19 on the same benchmark test.

Samsung is also undercutting the NCD-19 in price, suggesting a price tag of under $3,000 for the basic unit with 2 megabytes of RAM, compared to $3,400 for the NCD-19.

By the time that the Samsung SGS-19 becomes available, however, its NCD target may have moved. "We are working on two 19-inch units, one aimed at high performance and one aimed at lower price," said NCD president Bill Carrico. Few NCD-19 customers would require more processing power in the terminal CPU; NCD terminals should sell on the basis of a more mature software implementation of the X Window System, he said.

"We have font caching and remote configuration, as well as DEC-Net support, and in the next release of our software we'll have SNMP and LAT support as well," Carrico said.

Samsung Software America, Corporate Drive, Andover, MA 01810; (508) 685-7200.



Samsung's prototype SGS-19 X Window graphics terminal is expected in the fourth quarter.

OSF Will Be Compatible With SCO's Xenix 2.3 and Unix 3.2

BY MARTIN MARSHALL

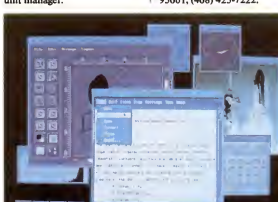
The Open Software Foundation's OSF/1 operating environment will be capable of running applications written for SCO's Xenix 2.3 and Unix 3.2 environment, the two companies announced last week.

Locus Computing Corp. will provide the software engineering, and OSF and SCO engineers will coordinate the interface specifications. "OSF is responding to its members' desire to preserve their investment in applications for Intel-based platforms when moving to OSF/1," said Grace Perez, OSF business unit manager.

SCO is aligned with both the AT&T and OSF camps and maintains a dominant position in the Intel-based Unix market with over 300,000 systems installed. Its Open Desktop product uses OSF's Motif user interface. "Developers can now write to the Open Desktop platform and know that their applications will run on the future OSF installed base," said David Bernstein, SCO's director of system product marketing.

The software is scheduled for completion by the first half of 1991, the companies said.

The Santa Cruz Operation, 400 Encinal St., Santa Cruz, CA 95061; (408) 425-7222.



Applications developed for SCO's Xenix 2.3 and Unix 3.2, including Open Desktop (above), will run on OSF/1 based systems.

Interactive Expands Its Unix System V Interface Software to Include Netbios

Interactive Systems Corp. has upgraded the software it supplies to AT&T for Unix System V/386, Release 4.0. The new software, called Streamware, consists of TCP/IP, Netbios, and SNMP modules.

Streamware TCP/IP enhances bulk TCP throughput by 25 to 50 percent and also provides increased support for military standards.

Streamware Netbios provides a Netbios interface to the standard Unix services, so DOS-based applications such as Microsoft's LAN Manager/X can operate in Unix System V environments. This allows PCs to access printers and databases located on Unix systems.

Streamware SNMP extends TCP/IP networking to include networks managed by the Simple Network Management Protocol (SNMP). It allows Unix computers running under System V to be configured, controlled, and monitored by an SNMP station. All products are available now.

Interactive Systems Corp., 2401 Colorado Ave., 3rd floor, Santa Monica, CA 90404; (213) 453-8649.

— *Martin Marshall*

NEWS WIRE

● PUBLIC OFFERING

MICROGRAFX PROPOSES IPO. Micrografx Inc. has filed a registration statement with the Securities and Exchange Commission for an initial public offering of 1,300,000 shares of common stock. The offer is expected to take effect in June.

Comanaging this offering with the graphics software developer are Alex. Brown & Sons Inc. and Donaldson, Lufkin and Jenrette Securities. The price of the public offering is expected to be between $11 and $13 per share.

● AGREEMENTS

UNISYS AND INFORMIX TEAM UP. In a joint alliance with Informix Software Inc., Unisys Corp. will offer a new version of the Informix-Online OLTP database engine for its recently announced Open/OLTP environment. The Open/OLTP will provide a standards-based environment for commercial OLTP solutions on Unix systems. The companies will pool development resources for Open/OLTP products and develop a service and support program for OLTP applications.

UNISYS WILL CARRY SOLBOURNE WORKSTATION LINE. Unisys will resell Solbourne's Sparc-compatible workstations in a deal valued at more than $150 million over the next four years, the two companies announced last week. Unisys will sell Solbourne workstations as its S2000 family in Europe and Africa.

● FINANCIAL REPORTS

HEWLETT-PACKARD'S QUARTERLY EARNINGS SLIP 5 PERCENT. Hewlett-Packard Co. reported mixed second-quarter performance last week — with net earnings down 8 percent from the same period last year, even though both net revenue and orders were up 16 percent. The earnings slippage reflected both one-time costs and a growing emphasis on lower-profit items in the product mix, HP said.

● CUTBACKS

ARCHIVE LAYS OFF, REORGANIZES. Archive Corp., a maker of data storage products, laid off 108 workers — a reduction of 3 percent overall — from its recently acquired half-inch products group, Cipher Data Products Inc. The move is part of a reorganization that divides operations into six business units, each responsible for a product technology or market. Manufacturing will be consolidated in Singapore, with corporate headquarters in Costa Mesa, California.

■ MARKET IMPACT

Windows 3.0 May Spark Industry

Easy-to-Use GUI, DOS Base, OS/2 Migration Path, Cited in Support

BY PATRICIA J. PANE

Microsoft Corp.'s Windows 3.0 could be the boost the sluggish PC industry needs, according to industry observers and vendors.

"Basically, the biggest factor hurting PC growth is people not getting the productivity out of the PC hardware and software they bought," said Mary Chin, associate director for the microcomputer systems group at Dataquest. "And it has to do with ease of use. Windows 3.0 is the first graphical user interface they can use on 286- and 386-based machines."

Windows 3.0 overcomes some of the flaws encountered in the 2.0 version for applications development and adds some rudimentary capabilities.

Proponents say Microsoft is also dangling another carrot in front of developers: an easy migration path between 3.0 and OS/2's graphical user interface, Presentation Manager.

"With Windows 3.0 being available and the big base of DOS users on client machines, more and more developers will see an installed base that will prefer to develop under Windows as a client base before developing under OS/2," Chin said. "Some independent software vendors are saying it took them only three months to convert from Windows 3.0 to OS/2 Presentation Manager."

The result is that Windows 3.0 will revitalize the PC market more than any other software product in the recent past.

Windows 3.0 will generate an estimated $70 to $75 million in sales the first year alone, and $125 million the following year, said David Bayer, an analyst at Montgomery Securities, in San Francisco.

"The bigger point is that Windows 3.0 is the first software product the industry has seen in some time that will prompt lots of people to upgrade their hardware — memory cards, hard disk drives, trade-ins to AT's and 386 systems," Bayer said. "That means that as Microsoft's fortunes improve with Windows sales, so will the entire industry's."

Zenith Data Systems (ZDS), AST, and Austin Computer Systems are just three hardware vendors bundling Windows to cash in on the expected upswing.

"Windows 3.0 opens a new genre of software that'll understand hardware so the user won't have to," said Glen-Eric Nelson, a ZDS spokesman. "With it, the hardware issues become nonexistent."

But Windows 3.0 has its skeptics. With 40 million PCs installed, and after five years, Windows has captured only about 5 percent of the market, and that includes 386-based machines, said Jeff Tarter, editor and publisher of *Softletter*.

"Probably a fair amount of people, if they had to put a dime into hardware, would say the hell with it," Tarter said. "Windows has not achieved [a large] penetration; and with Windows 3.0, it's setting the odometer back to zero," Tarter said. "So, no matter how fast [Windows 3.0] grows, it will not have a big impact on the hardware market. The whole market is probably a lot closer to the traditional character-based machines, machines that are not Windows-capable and probably never will be."

Dataquest's Chin predicts that the installed base will rise from 2 to 9½ percent by 1994.□

Projected Windows Shipments

Year	Units
1990	860,000
1991	2,830,000
1992	8,000,000
1993	9,020,000
1994	13,200,000

SOURCE: DATAQUEST

Analysts project a steady rise in Windows 3.0 sales as users seek a graphical user interface.

New Ashton-Tate Exec's Goal: Ship Dbase IV 1.1

Proctor Will Head Database Development

BY MARK BROWNSTEIN

For many months, database development efforts at Ashton-Tate Corp. have been without a strong visionary to guide overall development, analysts and Ashton-Tate insiders have said. Even the company's former CEO, Edward Esber, conceded the company needed someone with a clear vision of its database future.

Last week the company named David R. Proctor new vice president and general manager of the database division.

Proctor, who brings 23 years of IBM experience, said his first priority is to deliver Dbase IV, Version 1.1 as soon as possible. "That product is stabilizing very well and is close to a condition where we can ship it and be proud of it," he said.

Admittedly not a database expert, Proctor believes he brings a great deal to his new position.

"I'm a hard-line developer, and I've had to work on projects that had a heavy dependence on databases," Proctor said. "I'm not an expert on Ashton-Tate's Dbase, but I am an expert on development."

Dbase consultant Adam Green is not fazed by Proctor's lack of Dbase experience. "Ashton-Tate needed a Dbase manager and a guru, and it couldn't be the same person," Green said. "[Dbase author] Wayne Ratliff could be brought back as the guru, but it's not likely." Green said the company should focus on slowing down the erosion of its market share, which he predicted will continue to decline during the next two years.

Proctor also plans to evaluate the existing Dbase strategies and determine where changes may be needed and the direction the future technologies should take.

However, without a successful Dbase IV 1.1, there may not be enough future for Ashton-Tate to make these new products become real.

Proctor's approach to product development should provide a significant change for Ashton-Tate. Dbase products will be developed with a common code core, which will allow Ashton-Tate to rapidly release versions of new products that will run on such additional platforms as Unix workstations, the Mac, VAX systems, and possibly other computer platforms.

Other changes were made to the Ashton-Tate database management as a result of Proctor's appointment. Floyd Bradley, who was acting as interim manager of the database products division, will return to his position as vice president and general manager for Europe. Joseph D. Brilando, a longtime Ashton-Tate employee who was last serving as vice president of corporate market and strategy, resigned May 21 to develop a technical marketing consulting practice in Silicon Valley, Ash-ton-Tate said.

— *Scott Mace contributed to this story.*

Sears Business Systems Wins Federal PC Contract

BY SCOTT MACE

A four-year contract to buy up to $400 million of IBM PC compatibles, Macintoshes, and Amiga computers was recently awarded by the U.S. Treasury Department to Sears Business Systems Centers of Chicago.

The Departmental Microcomputer Acquisition II contract has an estimated 75,000 computers along with thousands of printers, monitors, disk drives, memory systems, communication devices, software, and support services.

The desktop computers included are AT-bus PC-compatible 286 and 386 machines from Everex, IBM Micro Channel computers or compatibles, Apple Macintosh SE and II computers, and an estimated 30,000 laptop computers from NEC, Sears officials said.

Software in the contract includes Word Perfect, Lotus 1-2-3, and DBMS software including Ashton-Tate's Dbase, the Informix DBMS, and Oracle Corp.'s DBMS. Users can purchase DOS, Unix, or OS/2 systems. LAN products and installation are provided as well.

The contract has been in the works for almost two years. The I.R.S. is expected to be the principal user, but department officials expect the entire department to benefit from the award.

The Commodore Amiga 2000 was selected to fill a requirement for a non-Macintosh 68000-based system, according to Bob Huberfeld, DMAC II program manager at Sears. "It's an indefinite quantity, indefinite delivery requirements contract, not an application-oriented procurement," he said.

Orders will begin being filled as soon as the possibility of protests by losing vendors has passed, Huberfeld said. No protests had been filed as of May 18, he said. Officially, the contract runs for one year with three one-year extension options.

Sears officials said their proposal won on technical and price evaluations. It was the company's first major bid as a federal PC systems integrator, as well as the first major contract involving OS/2 software and Commodore Amiga hardware.

STATE OF THE INDUSTRY ▪ By Rachel Parker

Graphical Environments for the Masses Are Out There

Seems like every time we get all excited about Windows, a faint voice from the prairie says — but what about the rest of us?

As Microsoft Windows has matured, it has also grown more and more dependent on sophisticated hardware. Back in the mid-1980s, Microsoft said that Windows would run on a two-floppy system; anyone who tried that found that the statement was little more than wishful thinking. Now Microsoft recommends at least an 80286 and 1 megabyte of memory for Windows; and developers point out that to run any applications in that environment, users will need more memory. An 80386 is also a good idea.

That leaves a lot of users out of the Windows world. Despite all the various economies of improved chip technology, not everyone can afford the 80386SX that Bill Gates recommends as a baseline system. Many businesses don't earmark thousands, if not millions, of dollars for computer upgrades just because better technology is available.

So here we are, locked into DOS, right? Well, not quite. For nearly two years, Tandy has been promoting its Deskmate environment as the perfect way to give entry-level users an environment that's easier to use than DOS. By bundling Deskmate with all its systems, Tandy is trying to bring windowing to the masses. John Roach, chairman of Tandy, calls it the Unfortunate Five Million.

Now Berkeley Softworks is trying the same thing. The company is working on a product that will not only give users windowing capabilities, but also some multitasking and multithreading features — all on basic 8088s and 8086s. The product, code-named OS90, will be marketed to the same users that Tandy addresses with its Deskmate.

If you talk to the Deskmate developers, you get a unanimous cheer for Tandy's stores and the fact that they reach people in out-of-the-way places like Broken Arrow, Wyoming, or Woodland, Oklahoma. And Tandy salespeople are adherents to the Deskmate credo. They recommend Deskmate applications to computer buyers and stock only Deskmate programs in their stores; non-Deskmate applications are available through Tandy Express, but buying through the catalog means waiting for a day or two for your software.

So there is a powerful incentive for developers to rewrite their programs to fit into the Deskmate universe, stripping out features when necessary. By August 1989, Tandy was able to name about 25 packages — ranging from Lotus for Deskmate to some educational packages — that were or soon would be available for Deskmate. More than 100 software developers have signed Deskmate licenses, so more applications are promised.

But Berkeley Softworks doesn't have this kind of incentive to attract software developers to its environment — despite that it may be technically superior to Deskmate. It will have to try to attract developers — and customers — on the strength of its product alone.

Berkeley has a second problem, too. If it positions OS90 as being just like Windows but designed for the less robust systems, it may run into the computing machismo that many applications vendors find when they try to sell low-end versions of their core products. Who wants to admit that they need a Windows Jr., or take a chance using a Windows-Lite, knowing all the while that they could get "the real thing" if they only had an SX and more money for memory.

It is an image thing, one that Tandy gets around by selling the software and hardware together, and by having a sales team that assures first-time buyers that they are making a good decision. The same products and marketing might struggle if it depended on K-Mart and Macy's salespeople to put the package together.

Obviously, Tandy would like to make Deskmate a more broadly accepted environment, and Berkeley needs some way to get its OS90 to entry-level users. In the face of Microsoft's massive marketing budget and growing momentum, will low-end windowing catch on outside controlled channels? Stay tuned. But without that salesperson steering customers toward a complete solution, chances are that both environments will have to settle for a portion of those millions.

Rachel Parker edits InfoWorld's Perspectives section. Comments are welcome via MCI Mail (I.D. number 340-4371, or InfoWorld) or through traditional mail.

The IBM RISC System/
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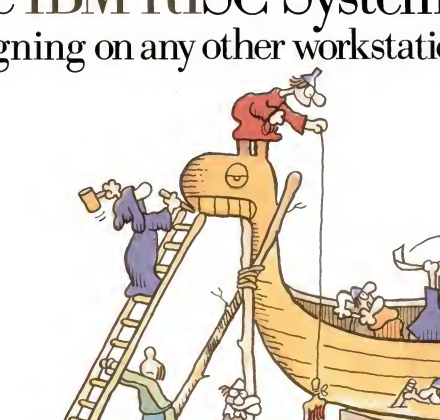

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TECH STREET ▪ BY JOHN GANTZ

Hungry Systems Vendors Start Eyeing the Services Market

Computer vendors have known for as long as there have been computers that software sells iron. The more applications running on your box, the more boxes you sell. Skill at wooing the software development community, even in the world of mainframes, has become a critical success factor for vendors. This is particularly true in the world of clones, open systems, and networked everything.

Now there seems to be a new wrinkle to this old adage: Consulting sells both software *and* iron.

In recent months both Microsoft and Lotus have signaled their intentions to add consulting as a line of business. Businessland has inked a pact with KPMG Peat Marwick & Main to provide professional services relating to PC installations. Apple has raised the profile of its systems integration unit. Hewlett-Packard has renamed its professional services products. And IBM has dispersed its systems integration and consulting sales activity, formerly in a centralized division, out to the field.

Meanwhile, Oracle, which formed a consulting group only a few years ago, will achieve close to $100 million in consulting and professional services revenues when its fiscal year ends this month.

So there you have it. Suppliers keep moving up the food chain in hopes of finding it easier to maintain account control. As defense contractors know, the more influence you have on developing the system specification, the more likely it will fit your system to a T.

The ultimate consulting organization is Andersen Consulting, the spin-off firm of the accounting giant Arthur Andersen. Its mix of services typifies what a modern professional services firm might offer — strategic consulting, IS system design, system integration, contract programming, and even facilities management to customers. Soup to nuts, as they say.

To a systems firm that has been watching hardware prices drop 30 percent or more a year, the allure of the professional services market is palpable. Most market estimates say revenues for professional services are destined to grow over 20 percent a year through the 1990s, and common sense says that the complexity of living in a multivendor, networked world will demand specialized skills that third parties might be in an excellent position to supply. And since consulting is something that you can go back and sell to your installed base, a strong business case can often be made to beef up efforts.

In your daily life as a corporate PC or Mac user, this increased attention to professional service by vendors may make itself evident in a number of ways. At this very moment, for instance, your company may be calling on its accounting firm's management consulting division for a study on how to do away with the MIS department, or how to switch to OS/2 without losing man-years of productivity, or how to rationalize procurement of LANs across the company.

If you come in daily contact with the actual consultants, contract programmers, or other professional services technicians, you may at first wonder why your company had to reach outside the organization for help. Lots of times the answers lie within.

But lots of times they aren't easy to pry loose. As a consultant myself, I can tell you that someone in the organization almost always knows as much as a consultant. But they aren't always as articulate, as unprejudiced, or as divested of political coin as the outsiders.

What I'm not so sure of is that, with all the new players on the professional services block, there won't be some missteps. Hardware companies like Apple and Digital that know how to get products out the door may not also know how to manage professionals on a large contract where time is literally money.

You see, there are a few keys to the consulting business. One is finishing jobs on time. Another is pricing to include unforeseeables. Yet another is setting clients' expectations. It ain't easy. A lot of consultants I know would rather be in the hardware business.

So watch. The demand for professional services and consulting *will* increase from our portion of the computer market. So will the supply. Let's hope they're well matched.

John Gantz is editor of the Tech Street Journal, *a newsletter on the high-tech stock market and business performance. The views expressed are his own.*

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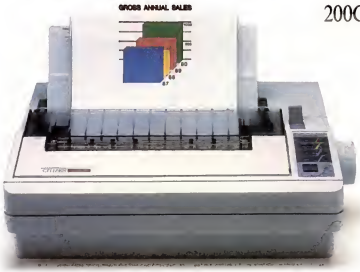

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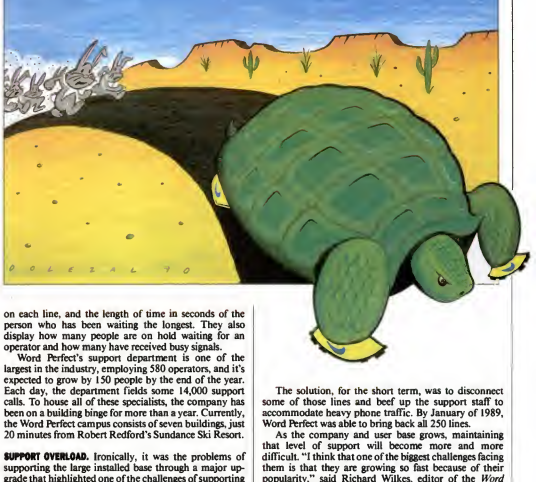
PERSPECTIVES

Leader of the Pack

Low Key and Committed to Support, Word Perfect Paces Itself to Move Its Fanatical Users Into the Graphics Era

BY YVONNE LEE AND RACHEL PARKER



"We wish Word Perfect were a poorly managed company that did a lot of things wrong," said Bruce Cummings, executive vice president of Samna Corp.

That sums up how many competitors feel about Word Perfect, the Orem, Utah, software company that has steadily overtaken its competition in the word processing category. Most publishers underestimated the company, which lacked a Silicon Valley address, flamboyant chairman, or trendy product. Now, nearly 11 years after its founding, Word Perfect maintains a healthy lead on the rest of the word processing market.

In fact, Word Perfect has more than gained the lead in the word processing market. If the market were a marathon, Word Perfect would finish the 26-mile race 10 miles ahead of the next competitor.

Dataquest figures indicate the company doubled its sales to 1.78 million units last year. In 1988, sales rose by 50 percent, a slump compared to the previous years' double and triple sales gains. According to Dataquest analyst Marshall Moseley, Word Perfect outsold Word for DOS — its nearest competitor — by some 35 to 40 percent in 1989.

Competitors hope that the privately held Word Perfect may trip over its own success as the industry and market make the shift to graphical interfaces. Shifts to new operating systems have taken up the PC industry hierarchy in the past, and even Word Perfect admits that creating a product for the graphical environment and shifting its large installed base to it will be the company's biggest challenge to date.

THE SNEAK ATTACK. In the early 1980s, the word processing category was virtually owned by Micropro, now known as Wordstar. The Wordstar package had staked an early claim in the CP/M market, and many assumed that it would continue to lead the market in the DOS era. But Micropro committed a fatal mistake: It began to believe that its installed base was immune to challenges by other products. Upgrades lagged, and users began migrating to the more feature-rich Word Perfect.

"Word Perfect's trick was to sneak up on the world when no one was paying attention but the customers," said Dick Shaffer, editor of the *Technologic Letter*. "They just kept making better product while the rest were resting on their laurels. If Wordstar and Microsoft had gotten their act together, Word Perfect would not exist today."

Today, Word Perfect is clearly the one to catch in the word processing market. Principally on the strength of the word processor, the company is in the middle of what promises to be a $400 million year. And former market contenders such as Wordstar and Multimate are struggling to regain some of their former users.

GENEROUS SUPPORT. Features alone have not been responsible for Word Perfect's popularity. Early on, the company established a generous support policy, providing toll-free telephone support. That policy set the high-water mark for other publishers to meet — or explain why they don't. When competitive products were close to Word Perfect on a feature-by-feature comparison, the toll-free support may have won customers.

Consultant Dane Wycoff of Montebello, California, for example, says that post-sale availability of training on a program is a top priority.

The commitment to support extends all the way to the executive offices. Four executives have monitors in their offices showing the activity on the toll-free lines. The monitors display which lines have people waiting for a customer services operator, how many people are waiting on each line, and the length of time in seconds of the person who has been waiting the longest. They also display how many people are on hold waiting for an operator and how many have received busy signals.

Word Perfect's support department is one of the largest in the industry, employing 580 operators, and it's expected to grow by 150 people by the end of the year. Each day, the department fields some 14,000 support calls. To house all of these specialists, the company has been on a building binge for more than a year. Currently, the Word Perfect campus consists of seven buildings, just 20 minutes from Robert Redford's Sundance Ski Resort.

SUPPORT OVERLOAD. Ironically, it was the problems of supporting the large installed base through a major upgrade that highlighted one of the challenges of supporting a popular product. When 5.0 shipped in May 1988, the company underestimated the demand for telephone support. Although it bought additional phone lines, traffic was so heavy that calls to the support department brought down the toll-free systems for the state of Utah, including phone systems for American Express, Delta Airlines, and the Latter Day Saints Church.

"I guess there weren't enough phone lines from Denver to Salt Lake to handle all that traffic," said Stan Mackay, director of customer support. "AT&T was really doing some scrambling. We had more lines than people [to answer them]."

> *"If we worried about what everyone else was doing, we'd get jerked all over the place."*
>
> — Alan Ashton

The solution, for the short term, was to disconnect some of those lines and beef up the support staff to accommodate heavy phone traffic. By January of 1989, Word Perfect was able to bring back all 250 lines.

As the company and user base grows, maintaining that level of support will become more and more difficult. "I think that one of the biggest challenges facing them is that they are growing so fast because of their popularity," said Richard Wilkes, editor of the *Word Perfectionist* newsletter. It will be difficult both to continue growing at its current rate and to provide a high level of support to a growing customer base, he added.

Despite the increasing costs and logistical problems, analysts believe Word Perfect cannot afford to trim back its pledge to support. "The one risk is if they stop doing what they do well," said David Bayer, a software analyst with Montgomery Securities, in San Francisco. "They really do listen to customers. . . . And they cannot stop."

INTERIM UPDATES. One of the few criticisms that anyone will make of Word Perfect is that it has released several "interim updates," slight modifications of the program without a new version number or announcement.

Users at large installations have been confused by interim updates when they encounter a glitch on one machine and try to duplicate the problem — unaware that the problem has been corrected on a later version.

Some users also complain that they don't hear when an update is available. The *Word Perfect Corp.* report, which goes out to registered users, reports on each upgrade's new features and bug fixes, but it doesn't come out until a month after the upgrade is released.

Interim updates pose problems for Word Perfect's partners as well, who have to field calls from their users and try to figure out where incompatibilities might be. "Every time Word Perfect would come out with an interim update, the guys in technical support would shudder, because they'd have to try to figure out what's different," said Steven Potash, chairman and founder of Overdrive Systems, which makes a mail-merge add-on

Word Perfect's Support Specs

- Busiest day ....**Wednesday** (average 13,500 calls)
- Least busy day..... **Friday**
- Number of operators **580**
- Number of phone lines..... **250**
- Average length of time spent waiting for an operator..... **45-60 seconds**
- Percentage of calls that get through on feature line..... **20 percent**
- Percentage of calls that get through on printer line..... **92 percent**
- Percentage of calls that get through on dot-matrix printer line.. **96 percent**

for Word Perfect and Microsoft Word.

THE SHIFT TO GUI. Interim updates and periodic troubles with customer support, however, are not enough reason to prompt users to switch to new products. Competitors hope to gain some ground on Word Perfect as the industry adopts graphic user interfaces. Many were probably encouraged when Word Perfect's much-anticipated Macintosh word processor failed — a victim of simply porting a successful DOS application into the more graphical Mac environment.

Word Perfect blames its failure with the first Mac version on rushing into the market. The update of the Macintosh program was announced at this spring's Macworld Expo and is scheduled to ship in August. At the same time, the company has announced it will ship a Presentation Manager version — likely in November of this year — and a Windows version — expected in early 1991.

Word Perfect officials say they want to avoid the pitfall of rushing to market with its Windows and Presentation Manager products.

Executive vice president Pete Peterson said that the company has given the OS/2 team more freedom than the original Mac team had. "We're trying not to rush it so we don't do the wrong thing," Peterson said. "We're trying to give them more freedom than we gave the original Mac team."

Still, changing from a character-mode product to a graphically oriented one is a challenge.

"The hardest thing that we are doing is making the GUI product," said Chuck Middleton, director of OS/2 development at Word Perfect. "You have a lot of freedom with the new interface to do a sloppy job, or to do it right. To do it right — especially with a character-based product — is hard."

Middleton believes that the hierarchical menu design solves much of the problem. Experienced Word Perfect users will be able to use keystroke shortcuts, while the program will support pull-down menus. In addition, the menus are organized in such a way that users can use logical keyboard mnemonics for such functions as disk file, Middleton said.

THE USER BASE. While Word Perfect has said it is working on both PM and Windows products, the company resists temptation to announce a firm ship date for those products. Most observers believe that the company is taking its time both developing the products and research ing the market. But, those distant dates leave some room for competitors to establish market share and momentum with their own GUI products.

"If Windows and the adoption of GUI goes berserk this fall, I think Word Perfect would be hurting," said Samna's Cummings. Samna has been shipping its Ami Professional Windows word processor for nearly a year.

Word Perfect officials, however, say they are not worried about being late to the Windows and Presentation Manager markets. "If we worried about what everyone else was doing, we'd get jerked all over the place," said president and founder Alan Ashton.

Peterson puts it another way: "I'm not the jealous type, and I hope that my wife doesn't run off with another man, but I'm trying to worry about being a good husband and father, rather than worrying about her straying. Some people are going to stray. Some people won't [stray] because we're going to have a good product. "I think we have to remember some truths about computing: there's a lot of inertia behind a product," he added.

The large installed base is both an asset and a liability when it comes to such an upgrade. Like Lotus, Word Perfect cannot afford to force its customers to give up the keystroke commands they can virtually perform in their sleep for a mouse. If it did, customers could just as easily start evaluating competitive products, such as Word for Windows or Ami.

"Word Perfect has to be responsible to so many users they already have," said Daniel Will-Harris, author of *Word Perfect: Desktop Publishing in Style*. "It's hard for them to come out and change the program without a lot of people getting mad."

While analysts are waiting to see whether being late to market will hurt Word Perfect, users say the installed base isn't in a great hurry to switch to a Windows word processor. "I think Word Perfect's going to be there when there's a significant market," said Wilkes of the Word Perfect support group. "Being the first is not always the best thing to do. I get the sense that while most companies may be using some Windows products, and it may be on their list of strategic requirements, the fact that Word Perfect's working on it is enough. With that many people who are trained in the character environment, those people are not going to take a jump all of a sudden to a graphical environment."

Word Perfect to Bring Product to Every Platform

Basing its strategy on its top-selling DOS word processor, Word Perfect plans to bring the word processor onto all major platforms.

Word Perfect is currently available on DOS, OS/2, the Macintosh, Unix, DEC's VAX, and IBM's 370. The company has also announced it plans to release versions for OS/2 Presentation Manager, Windows, and the Next computer. Although Word Perfect originally intended to model all versions on its successful DOS product, the company has abandoned that plan since the Macintosh community rejected the original Macintosh incarnation, which was considered un-Mac-like.

"Our products will look a little different from one another based on the platform that they're on," said executive vice president Pete Peterson. "You're going to expect it to follow the conventions of the machine, rather than be identical from platform to platform."

Moving the word processor to other platforms while maintaining distinct user interfaces will present some technical challenges. The DOS program is written in assembly language, which allows the program to run more quickly than programs written in higher-level languages. On the other hand, because assembly language is specific to a particular machine's architecture, the program must be rewritten for each platform.

In this age of portability, many developers are rewriting their applications in C, an option that Word Perfect considered and dropped.

"We could go to C right now," said OS/2 development director Chuck Middleton. "The disadvantage of that is that it takes a tremendous amount of time to go over to C. We would ship the product at least a year later."

For example, When Word Perfect wrote Version 5.0 for Unix, it translated the entire package to C. "That took a fair amount of effort, and the program now is lagging behind a whole version. We need to keep up with the same features [as are in the DOS core.]"

Instead of rewriting each program from scratch, various development groups are trying to use as much assembler as they can, and write new user interface code in C, Middleton added. The OS/2 development team is writing the Presentation Manager interface with C, and is evaluating C++.

"We are doing the best thing now that we can, and are getting product out sooner than we would have otherwise," Middleton said.

"Down the road, when compilers get better and processors improve, it makes sense to be in C. As it gets more important, we will be there," Middleton added.

MICROSOFT. If any package stands to gain either from Word Perfect's absence or its inexperience with other graphics-oriented platforms, it is Microsoft's Word. The runner-up in the DOS world dominates the Macintosh market and has a super-charged Windows version, which began shipping early this year.

"Microsoft Word has its roots in the graphical environment," explained Tracy Bove, editor of *Bove Rhodes Inside Report*. Bove said he believes that Microsoft's experience on the Mac will help it get ahead on other graphical platforms.

Microsoft is also a strong competitor and has said that it views word processing and spreadsheets as critical categories to lead. "Microsoft will fight tooth and nail to get dominant share," said Brian Mutters, a PC software analyst with Strategem of San Francisco.

The rivalry with Microsoft goes beyond the competition for the word processing market. Company officials have often complained about the systems developer competing in the applications market, pointing to the ease with which Microsoft programmers could get a jump on their competition by casually chatting with systems programmers. With Microsoft driving the move to graphic user interfaces, the rivalry has become more of a philosophical one than a simple market share battle. In conversations, Word Perfect officials question whether Microsoft is putting too much emphasis on windowing environments.

To help secure positions against Microsoft, Lotus and Word Perfect formed a technology alliance in November of last year, breaking Word Perfect's long-held promise to develop in-house technology. While the companies have said that the alliance is for development of the graphical user interface, most analysts expect Word Perfect for Windows to include links to 1-3 spreadsheets.

"It's in Word Perfect's best interest for Word Perfect to integrate with an industry-leading spreadsheet," said software analyst Marshall Mosely.

NATURAL EXTENSIONS. While Word Perfect is clearly the company's cash cow, it is not banking on the program exclusively. Office Perfect, a combination E-mail and memo package, has been described as a strategic, natural extension of Word Perfect's strength in memo and letter creation. Rather than simply pitching Office as a communication medium or "groupware," the company is billing the program as a way to send Word Perfect documents.

The company plans to link Office to the market standards on each platform, such as Vaxmail on the VAX and Profs on IBM mainframes. Eventually Word Perfect intends to evolve the Office mail engine into a message transfer agent that conforms to the CCITT's X.400 standard. In short, the company plans to get Office against existing mail programs. "We feel we will be able to go up against CC:Mail and Higgins," Ashton said.

The ambitious OS/2 one of the most robust word processors is also expected to release a low-end word processor, called Letter Perfect. Like other companies, it is trying to serve its existing user community without alienating those who only use basic features in a word processor.

SPRINTING DOESN'T HELP. As users learn more of the benefits of using a graphics-oriented word processor, Word Perfect will have to prove that it can translate its core product into a new format, without abandoning its existing user base. Acknowledging the challenge, Word Perfect officials view their role as participating in an evolutionary transition, rather than leading a revolution. They also refuse to overreact, to speed up what is proving to be a difficult process.

"Sometimes, if you are behind, you must sprint to catch up. Other times, you must simply keep up," Peterson said. "We see ourselves in a more marathon, than a sprint. Sprinting doesn't help anyone in this situation. It just wears you out." □

"We see ourselves in a marathon, rather than a sprint. Sprinting doesn't help anyone in this situation."

— Pete Peterson

INFO WORLD

Windows

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An in-depth profile of Windows 3.0, Microsoft's HOT new graphical environment. How it works, what users think of it, and the products that support it.

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Windows 3.0: Worth the Wait

BY MICHAEL J. MILLER EDITOR

ILLUSTRATIONS BY BUD PREY

Everyone has been talking about Windows 3.0 for so long that it's hard to believe that Microsoft has only now formally announced it. Unlike OS/2, where new releases and even vague plans seem to be publicly discussed months or years in advance, Microsoft has kept Windows 3.0 officially unannounced, seeming to prefer the various "leaks" about the product and its features. Without ever officially announcing the product, Microsoft has seeded developers across the country, previewed it for thousands of potential customers, and discussed it with Wall Street and other analysts.

So it's finally here, later than Microsoft had originally planned, and the question of the year is: Was it worth the wait? For the many people who have wanted a graphics-based environment and a consistent user interface on DOS-based machines, the answer will be a definite, unhesitating "Yes."

Windows 3.0 is more than an update; in many respects, it's a whole new environment that will provide users with many of the features they've wanted for years but thought they would have to switch to OS/2 or UNIX to get. The environment uses the protected-mode features of the 286 and higher chips, providing access to extended memory, better multitasking, and more powerful applications. It also sports a much-improved user interface, including better-looking icons and buttons, more colors on-screen with the basic drivers, and new, more graphical ways of launching applications and managing files. As a result, many users will now be able to use Windows as their primary operating environment, launching and running multiple Windows-based and traditional DOS-based applications. Just as importantly, Windows 3.0 has gained much respect in the software community, and soon you should see significantly more applications and development tools.

Most reservations about Windows fall into two categories. First, while it will *theoretically* run on almost any DOS-compatible PC with a hard disk and a graphics display, you will want a fast 286- or 386-based PC with at least 1 megabyte of extended memory in order to get the speed most people will find acceptable. Second, most applications written for previous versions of Windows don't run properly under Windows 3.0, so you'll have to get updated programs.

Nonetheless, the vendor and user response to Windows 3.0 to date has been phenomenal. The product promises to be everything Windows was supposed to be at its inception and much more.

MEMORY MANAGEMENT. Although the interface is the most visible change in Windows 3.0, it's probably not nearly as significant as the environment's redesigned memory management scheme. Finally, Windows manages memory well enough that multiple applications can be run with little chance of running into a memory conflict or ceiling. (See "Windows Makes a Comeback, Addressing Its Memory Problems," Page S12.)

Rather than having two separate versions — Windows/286 and Windows/386 — Windows 3.0 is a single package that reads your system and normally installs itself to take advantage of your CPU and memory.

Windows 3.0 can run in one of three modes: Real mode, which requires 640K of memory and an 8088, 8086, or better, runs much like Windows did before, and provides compatibility with existing applications. Standard mode, which requires a 286 and at least 1 megabyte of memory, takes advantage of extended memory and can use the 286's protected-mode features. Finally, a 386 enhanced mode, which only works on a 386 with at least 2 megabytes of RAM, includes even more sophisticated memory management, including letting the system act as if it had more memory than it really does, and allowing multiple non-Windows DOS applications to run simultaneously.

The most basic change in Windows memory management is the support of protected mode and extended memory on a 286-, 386-, or 486-based system. Protected-mode memory has several advantages that all manifest themselves in streamlined memory management.

Protected mode allows Windows 3.0 to use extended memory — the memory above 1 megabyte that only exists on a 286 or higher. Programs can address this space; while invisible to end-users, it allows for both larger and faster applications. This is because extended memory is faster than expanded memory, which requires that 64K chunks of memory be moved in and out of the lower 1-mega-

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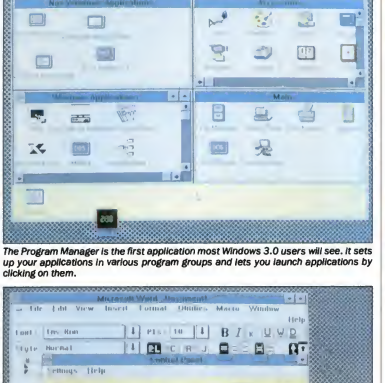
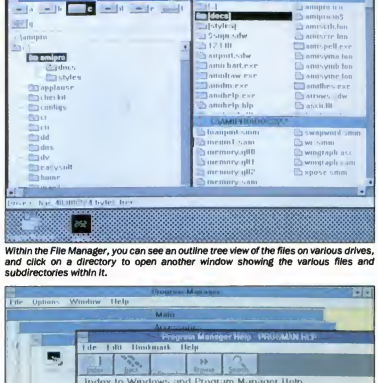
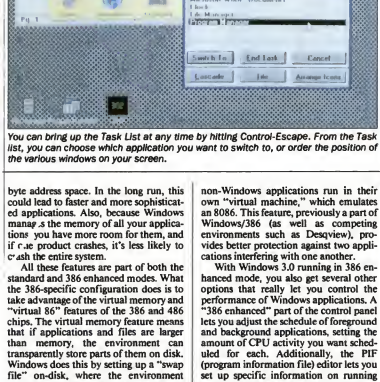
How Windows 3.0 Works



The Program Manager is the first application most Windows 3.0 users will see. It sets up your applications in various program groups and lets you launch applications by clicking on them.



Within the File Manager, you can see an outline tree view of the files on various drives, and click on a directory to open another window showing the various files and subdirectories within it.



You can bring up the Task List at any time by hitting Control-Escape. From the Task list, you can choose which application you want to switch to, or order the position of the various windows on your screen.

Windows 3.0 comes with a complete hypertext-style help system. You can jump from one help screen to another by clicking on the highlighted text, or search for a particular keyword.

byte address space. In the long run, this could lead to faster and more sophisticated applications. Also, because Windows manages the memory of all your applications you have more room for them, and if one product crashes, it's less likely to crash the entire system.

All these features are part of both the standard and 386 enhanced modes. What the 386-specific configuration does is to take advantage of the virtual memory and "virtual 86" features of the 386 and 486 chips. The virtual memory feature means that if applications and files are larger than memory, the environment can transparently store parts of them on disk. Windows does this by setting up a "swap file" on-disk, where the environment stores parts of programs or data that it doesn't need at any given point. This lets you load more and larger applications, and larger files. It's a big improvement over previous versions of Windows, where the Windows-specific applications ran out of memory more easily and more often than non-Windows applications.

Windows 3.0 also supports the virtual 86 feature of the 386, which means that non-Windows applications run in their own "virtual machine," which emulates an 8086. This feature, previously a part of Windows/386 (as well as competing environments such as Desqview), provides better protection against two applications interfering with one another.

With Windows 3.0 running in 386 enhanced mode, you also get several other options that really let you control the performance of Windows applications. A "386 enhanced" part of the control panel lets you adjust the schedule of foreground and background applications, setting the amount of CPU activity you want scheduled for each. Additionally, the PIF (program information file) editor lets you set up specific information on running non-Windows applications — including the amount of system time dedicated to the application when it is in the foreground and background; how much XMS and EMS memory to assign the application; and the video mode in which an application should run. While most will probably use the default settings, these options can help you adjust the performance of Windows so that you can use the environment more easily in speed-critical or speed-sensitive applications.

Under 386 enhanced mode you can mark, copy, and paste text to and from Windows applications via the clipboard.

The price for the move to protected memory is that most applications designed for Windows 2.0 simply won't work under Windows 3.0 unless they have been specially "marked" by the developer to run under Windows 3.0. A marked application is one that, while not a full-fledged Windows 3.0 application, will run under both Windows 2.11 and Windows 3.0. You get error messages if you try to run existing or older versions of almost all the popular Windows programs, although in recent weeks, revised versions of Microsoft Excel 2.1C, Micrografx Designer, Corel Draw, Samna Ami Professional, DCA Crosstalk for Windows, and Dynacomm have appeared that now run fine in protected mode. (Microsoft Word for Windows also runs out of the box.) In most cases, many upgrades are currently ready and will be available free or for a relatively small cost, but you will have the hassle and, most likely, some delay in obtaining the upgrades. (See "Upgrade Policies for Major Windows Products," Page S15.)

In the meantime, if you need to use old Windows applications, you can run Windows in real mode by starting the program using the "Win/r" command. This places the environment in "real mode," meaning that none of the protected-memory features is available, and as a result, the environment is slower and won't run any new applications that require protected mode. But this *does* let you run your applications, includes the new user interface, and is also the only mode available if you're running on an 8088/8086-based PC or any machine with less than 1 megabyte of memory.

Note that while most DOS (or non-Windows) applications will run well under either standard mode or 386 enhanced mode, those that use protected mode today (via a DOS extender) cannot work under the 386 enhanced mode, because it has its own incompatible memory management scheme. As a result, if you're running one of these applications (such as 1-2-3, Release 3.0), you'll

need to run it under real or standard mode, or wait until a fix for the application is available. Some third-party fixes, such as 3-for-3 from Iris, are available.

USER INTERFACE. While memory management changes are arguably the most important aspect of the new Windows, the user interface changes are most overt — and likely to be discussed the most.

These alterations are obvious from the moment you start running the environment — in fact, when you install it. The installation procedure actually uses the Windows 3.0 interface and you graphically see desktop accessories and the like being installed before your eyes. Windows 3.0, much more than previous versions, is a completely graphical user interface. Multiple fonts, windows, graphics, and icons are hallmarks of this environment. And while a mouse is not strictly required, you will want one if you use Windows because it makes many operations easier to learn and use. As you would expect if you have used Windows or Windows applications before, programs typically have pull-down menus, multiple fonts, and mouse support.

Windows lets you work with multiple programs at once — even with non-Windows programs running with a "window" on-screen. You can also have an application fill the screen (when it is "maximized" by clicking on an up arrow in the upper right-hand corner) or displayed as an icon on the bottom of the screen (when it is "minimized" by clicking on the down arrow). Applications can share information via the Windows Clipboard or Dynamic Data Exchange (DDE).

As in Presentation Manager for OS/2 1.2, many of the elements of the environment have a 3-D effect. This is really just shading within the buttons and icons for such things as zooming and closing windows and scrolling text within a window, but it looks better and lets you more easily see when you've selected an icon or pressed a button in a dialog box.

This new look holds true for the basic Windows environment, the included applications, and all applications that run under Windows 3.0. For instance, if you run Word for Windows under Version 2.11, you'll see the old icons; the same program running under Windows 3.0 has new icons. Another obvious difference is that the basic drivers that come with Windows look better on an EGA or VGA monitor displaying 16 colors, rather than the previous eight-color drivers.

Icons within Windows have changed as well. Applications written specifically for Windows 3.0 can now have icons in color; you can have both application icons (for minimized applications), which typically appear on the bottom of the main Windows display, and document icons (for documents within applications), which typically appear in the bottom of an application window and cannot be moved outside of it.

The new graphical setup program determines the kind of processor, graphic adapter, and network you have; it also automatically installs the proper files. You can change the setup at any time, unlike previous versions of Windows that required you to reinstall it to make as simple a change as switching from an EGA to a VGA monitor. The printer setup has also been enhanced; primarily, the interface used to configure the printer has been more logically laid out and the task of changing printers has been simplified. You can still select a printer and configure it for the fonts or cartridges you use.

During installation, Windows installs a series of applications and accessories, and also scans your hard disk for applications you may want to run under Windows, including both Windows-based and non-Windows applications.

Among those programs installed during the setup process are the Program Manager, which you use to start other applications; the File Manager, which you use to move, copy, and delete the files on your disk; and the Task List, which you use to choose among loaded applications.

The first application you'll see is the new Program Manager, which appears in its own window, displaying icons representing various "program groups," each of which contains several icons representing other applications. These groups include a main group of basic Windows functions (for managing Windows and your files, and launching a DOS prompt); a group of desktop accessories; your Windows programs; non-Windows programs (as determined by the hard disk scan); and games. Each group is represented by an icon; by clicking on it you open up a window containing icons representing the individual programs. (You can move and rearrange these icons, but they must stay within the Program Manager window.) You can start applications by double-clicking on any of the icons.

During setup, Windows normally places programs in the correct groups by scanning your drives for program files it recognizes. Within the Program Manager, you can set up your own groups and install both Windows and non-Windows programs to these groups. You install applications by typing their name and location on disk (made easier to find with a browse option that lets you scan through your files). At this point, you can also select an icon for your application. Windows programs come with their own icons, and the environment includes several generic icons to represent non-Windows programs, such as those that look like a spreadsheet, word processor, database, and communications programs. Yet another option rescans your disk and adds applications automatically.

The other major part of the core of Windows applications is the File Manager, which you use to find a particular file, create a directory, or move, copy, delete, or rename files. The File Manager shows

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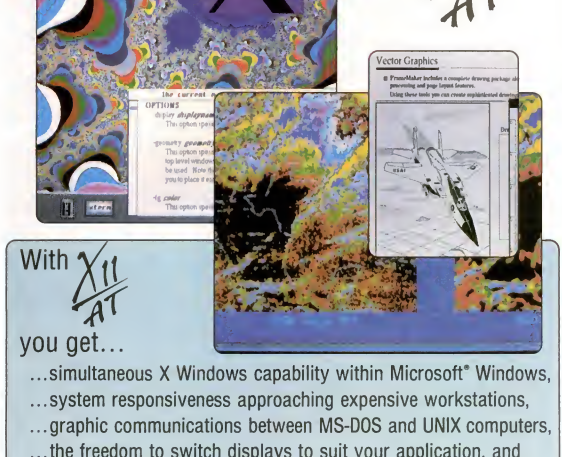

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the basic structure of each of your disks or partitions in a tree view, as in Xtree, but with some significant differences. Directories are represented by a file folder icon, while applications and batch files get an icon that looks like a Windows window; documents get an icon that looks like paper with writing on it; and individual files are represented by an icon that appears as a blank page of paper. Within the tree view, you can look at your hard disk as an outline. A directory shows a plus sign if it has any subdirectories, and you can click on it to show those directories or click again to hide them. This lets you control the level of detail you see.

You can open up any directory to see its contents by double-clicking on it, and show just the files by name (with a small icon to the left) or file details, including the file size, modification date and time, and file flags for attributes like archived, read/write, etc. You can pick any or all of these details you want displayed. Within this view, you can sort the directory by name, type (defined by extension), size, or last date modified, and include or exclude directories, program files, data files, or system and hidden files. You can show the files as text with icons to the left or in an icon view, which looks much like applications on the Macintosh.

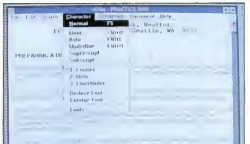
Within the File Manager, you can display multiple windows and in this way move applications between directories, etc. You can also copy, rename, or delete files; change their attributes; and create/delete subdirectories. The File Manager also includes a command that will search a partition or a subdirectory for specific files. You can search a directory or your entire disk for files that have a certain name (including wild cards), although it's not the keyword searching supported by OS/2 or the full text searching supported by some DOS shells. Within the File Manager you can also copy, format, label, and copy system files to a diskette, and connect or disconnect network drives.

An individual document can be associated with a particular application, either automatically by certain applications (such as Excel) or manually. Once it is associated with an application, it receives that program's icon, and you can launch the file into the application by double-clicking on the icon. You can also start applications by double-clicking on their icon in the File Manager or by using the Program Manager's Run command.

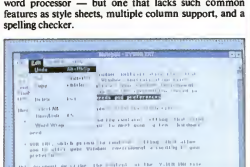
Whenever you are running applications, you can press Ctrl-Escape, or double-click on any unused background space, to bring up the Task List, which lists all the running applications and lets you immediately switch to the one you want. (You can also switch between applications by hitting Alt-Tab, which highlights the name of the next application, one at a time.) From within the Task List, you can arrange your running applications in a tile format (where each application is in small, non-overlapping windows) or a cascade format (where all the windows overlap, starting in the upper left-hand corner). The Task List also lets

Windows Accessories

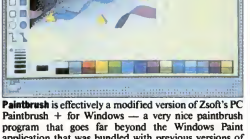
Windows 3.0 comes with a variety of accessories. This includes three full-featured applications (Write, Paintbrush, and Terminal); a number of smaller tools (Calculator, Notepad, Clock, and Calculator); and some built-in utilities (including a Print Manager, PIF Editor, and Macro Recorder).



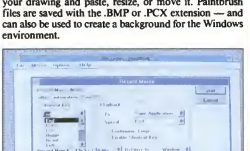
Write is a basic, executive-level word processor. It's a good introduction to how you would use a word processor within Windows. It's likely to be the first application that many Windows purchasers will work with, and as such it will give you experience selecting menu choices, using a mouse, and moving around within a document. Write has the basic Cut, Copy, and Paste commands that are common to most Windows applications, as well as individual character formatting — including font typestyle and size selection. As a word processor, it has the basic features and then some, including a ruler bar that you can use to set tabs and margins, line spacing, and alignment; search and replace (which includes wild-card searches and the capability to do a global replace); line and paragraph indentation; optional hyphens; headers and footers; and the capability to insert, move, and resize a picture copied from the Windows Clipboard. In short, it's a pretty powerful basic word processor — but one that lacks such common features as style sheets, multiple column support, and a spelling checker.



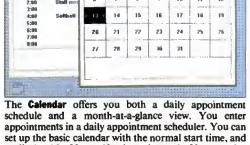
The **Notepad** is a basic text editor that is much smaller and more basic than the Write application, with minimal cut, copy, and paste; searching; and word wrap features. It's primarily useful for editing and saving ASCII text files.



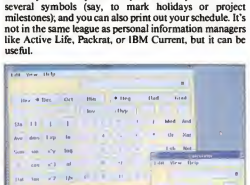
Paintbrush is effectively a modified version of Zsoft's PC Paintbrush + for Windows — a very nice paintbrush program that goes far beyond the Windows Paint application that was bundled with previous versions of Windows. Paintbrush is a color bit-map painting and editing program that lets you choose multiple drawing tools, line thicknesses, and colors. Drawing tools include straight line, curved line, paintbrush, roller, airbrush, eraser, and open and filled box, rounded box, circle/ellipse, and polygon tools. You can select a foreground and background color from the Windows palette of 16 colors on a standard EGA or VGA display — or you can create a custom color (displayed as a pattern on-screen). You can choose various fonts and sizes, depending on the selected printer. Other tools allow you to cut out part of your drawing and paste, resize, or move it. Paintbrush files are saved with the .BMP or .PCX extension — and can also be used to create a background for the Windows environment.



The **Recorder** captures your keystrokes and mouse movements, saves them as a macro, and lets you play them back whenever you want. You can play the macro by choosing it from a list or by assigning it a keyboard shortcut, such as Control-M. Macros can be up to 64K each, and you can include macros within macros.



The **Calendar** offers you both a daily appointment schedule and a month-at-a-glance view. You enter appointments in a daily appointment scheduler. You can set up the basic calendar with the normal start time, and to display 15-, 30-, or 60-minute intervals. You can also enter an appointment for a specific time, set an alarm, and have it ring a set number of minutes before an appointment. You can easily move to another day. The monthly view lets you mark particular days with one of several symbols (say, to mark holidays or project milestones); and you can also print out your schedule. It's not in the same league as personal information managers like Active Life, Packrat, or IBM Current, but it can be useful.



The **Calculator** accessory actually contains two calculators. A simple, standard calculator has the basic four functions, the capability to do percentages, and a single memory. By choosing a menu option you can switch the display to a scientific calculator, which includes many more functions for math, scientific, and statistical calculations. It can work in the standard decimal system, but also with binary, octal, and hexadecimal numbers.

you close a particular application if you need to.

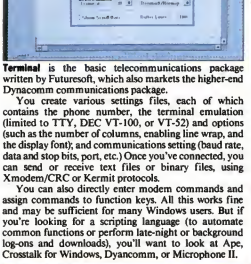
These three applications — Program Manager, Task List, and File Manager — form the heart of how you use Windows 3.0. They have replaced the MS-DOS Executive, a more text-based file management system used in previous versions of Windows. The result is a user interface that now looks and works very much like the interface in Presentation Manager (PM) for OS/2, Version 1.2. Typically in either Windows or PM, you start the application from the Program Manager, then load the files you want from within the application — similar to the way you normally started applications under DOS. This is in contrast to the Mac, where you often click on the file you want to open, which automatically opens your application. For applications that have file name extensions that you or the installation of the application assigned, you can double-click on a file name to launch both it and the application.

CLIPBOARD AND DDE. Windows applications share a common clipboard, making it easy to cut and paste information from one application to another. In addition, many Windows applications support DDE, which is essentially a "hot link" feature that lets a change in one application automatically be reflected in another. For example, if you change the data in a spreadsheet, these changes can be automatically reflected in the word processor. The quantity and quality of data exchanged via DDE is dependent in part upon how well the two applications understand one another. For instance, DDE links can be either one-way or two-way. In a two-way DDE link, not only would the spreadsheet data be included in your word processor, but changes you made in the word processor would be reflected back in the spreadsheet.

In the long run, DDE may actually allow you to create new applications that combine multiple Windows programs into a unified application customized for your needs. So far, we've seen just the beginning of the many things you should be able to do using DDE.

CUSTOMIZING WINDOWS. One of the most attractive features of Windows 3.0 is how much control it gives you over the way the Windows environment looks and runs. The control panel has been entirely revamped to include a series of icon-based applications that let you adjust different aspects of the environment. In this way, the Windows 3.0 user interface goes well beyond the PM interface.

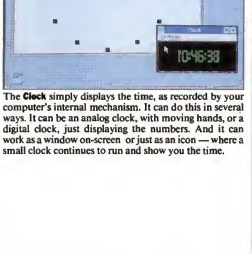
Under the colors option, you can set colors for any part of the environment, such as the title bar, background, and text. Windows comes with a number of artistically predesigned palettes, and you can choose among these or pick the colors of your choice. A desktop option lets you define how the Windows background will look; it can be either a pattern, an editable bit map that you repeat endlessly, or "wallpaper" — a bit-map file that can



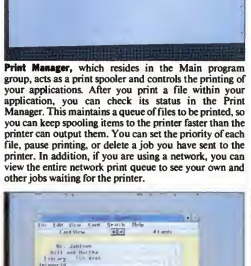
Terminal is the basic telecommunications package written by Futuresoft, which also markets the higher-end Dynacomm communications package.

You create various settings files, each of which contains the phone number, the terminal emulation (limited to TTY, DEC VT-100, or VT-52) and options (such as the number of columns, enabling line wrap, and the display font); and communications setting (baud rate, data and stop bits, port, etc.) Once you've connected, you can send or receive text files or binary files, using Xmodem/CRC or Kermit protocols.

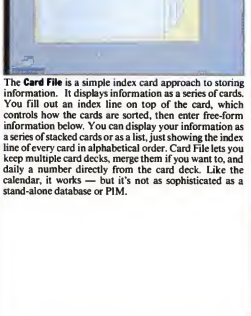
You can also directly enter modem commands and assign commands to function keys. All this works fine and may be sufficient for many Windows users. But if you're looking for a scripting language (to automate common functions or perform late-night or background log-ons and downloads), you'll want to look at Ape, Crosstalk for Windows, Dyancomm, or Microphone II.



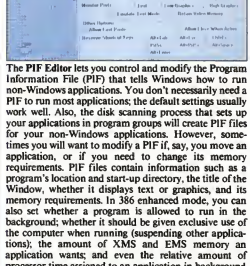
The **Clock** simply displays the time, as recorded by your computer's internal mechanism. It can do this in several ways. It can be an analog clock, with moving hands, or a digital clock, just displaying the numbers. And it can work as a window on-screen or just as an icon — where a small clock continues to run and show you the time.



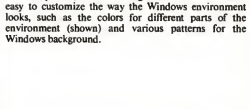
Print Manager, which resides in the Main program group, acts as a print spooler and controls the printing of your applications. After you print a file within your application, you can check its status in the Print Manager. This maintains a queue of files to be printed, so you can keep spooling items to the printer faster than the printer can output them. You can set the priority of each file, pause printing, or delete a job you have sent to the printer. In addition, if you are using a network, you can view the entire network print queue to see your own and other jobs waiting for the printer.



The **Card File** is a simple index card approach to storing information. It displays information as a series of cards. You fill out an index line on top of the card, which controls how the cards are sorted, then enter free-form information below. You can display your information as a series of stacked cards or as a list, just showing the index line of every card in alphabetical order. Card File lets you keep multiple card decks, merge them if you want to, and daily a number directly from the card deck. Like the calendar, it works — but it's not as sophisticated as a stand-alone database or PIM.



The **PIF Editor** lets you control and modify the Program Information File (PIF) that tells Windows how to run non-Windows applications. You don't necessarily need a PIF to run most applications; the default settings usually work well. Also, the disk scanning process that sets up your applications in program groups will create PIF files for your non-Windows applications. However, sometimes you will want to modify a PIF if, say, you move an application, or if you need to change its memory requirements. PIF files contain information such as a program's location and start-up directory, the title of the Window, whether it displays text or graphics, and its memory requirements. In 386 enhanced mode, you can also set whether a program is allowed to run in the background; whether it should be given exclusive use of the computer when running (suspending other applications); the amount of XMS and EMS memory an application wants; and even the relative amount of processor time assigned to an application in background or foreground.



The Windows **Control Panel** gives you a lot of options for customizing your environment, such as controlling network, printer, and font configurations. It also makes it easy to customize the way the Windows environment looks, such as the colors for different parts of the environment (shown) and various patterns for the Windows background.

Kiss it goodbye.

Introducing new Windows 3.0.

The graphical user interface (GUI) environment on an MS-DOS® PC and subsequent demise of the "C" prompt, is a reality today. Sure, you say.

Microsoft realizes you may have heard this one before. And we agree that you have every reason to be skeptical.

Well, all of this was before new Microsoft® Windows™ version 3.0. A GUI environment that will forever transform the way you use your PC.

Now, before you wonder what to do with all of your existing DOS applications (to say nothing about your existing DOS experience), the Windows environment works within your MS-DOS system. This is not a traumatic thing.

As a matter of fact, once you see the environment created by Windows 3.0, you'll think quite the contrary.

The first time you see it, you won't believe it. Archaic characters, mundane instructions, and even entire command sequences, have been replaced by a program manager full of clear, friendly icons. You're immediately comfortable.

When you work on more than one thing at a time, you'll quickly reap the benefits. Because the program manager welcomes on-screen multitasking of large Windows applications. Of course, without ever visiting the "C" prompt.

Through something with the complicated name of Dynamic Data Exchange (DDE), you can simplify your life. For example, with DDE, you can change

information in a Microsoft Excel spreadsheet, and have those changes automatically show up in a "linked" table in a word processing document. Or vice versa.

You can also easily access a network from within Windows. So, no matter how big the rivalry between research and accounting is on the softball field, everybody's on speaking terms in the office.

Even the setup program is graphical, only needing a few easy steps.

At this point, you probably think your machine will slow to a crawl the first time you try any of this.

We thought about that, too. So new Windows 3.0 breaks the 640K memory barrier that saddles other DOS programs. Giving you access to all the memory and power your 286 or 386 PC can muster.

It all sounds incredible. Which it is. And it's taking place in an intuitive, consistent graphical environment.

For more information or to learn about upgrading your current Windows version, call (800) 323-3577, Dept. L24.

Graphics-based software is how people will run their PCs in the 1990s.

And there's no better way to get yourself acquainted than Windows 3.0.

Microsoft

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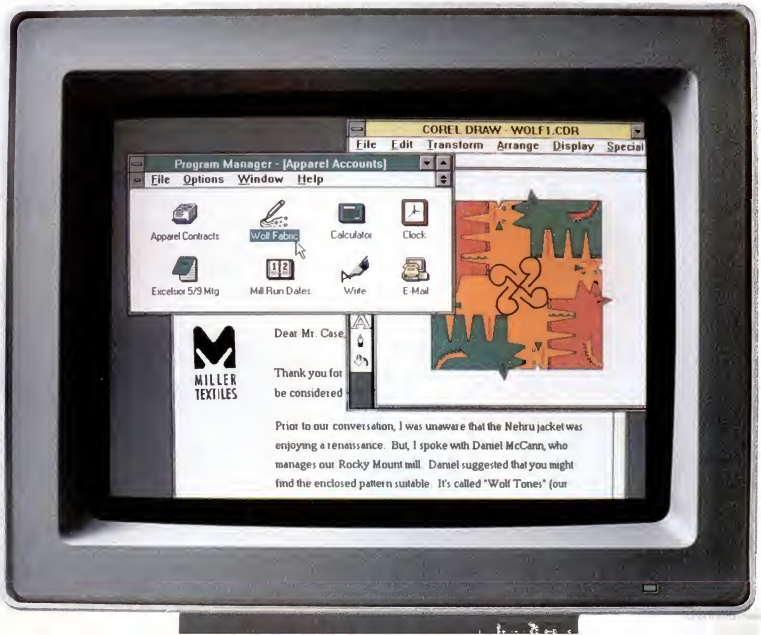

either fill the whole background, be centered on it, or repeat constantly. Other options let you perform such fine-tuning as setting the spacing between icons.

One nice feature about the control panel is the way it lets you control printers and fonts: you can easily add or change a printer's setup or add another one, and add or change fonts. (See "More Choices, More Confusion," Page S57.) Other options let you adjust the settings for the mouse, ports, keyboard, and international characters.

OTHER NEW FEATURES. This release at long last provides for networks, allowing you to choose among file servers (see "Has 3.0 Made the Connection?" Page S23), as well as support for color bit maps, COM3 and COM4, and improved fonts. In addition, help screens and messages seem much clearer, although you can still hit the likes of "Unrecoverable application error. Terminating current application. OK."

Another great addition to Windows is the on-line help system that gives you Hypertext-style help for the environment and included applications. You can find help by using an index, looking through lists of commands and procedures, or by searching for a particular keyword. Once you've found a help screen, you can jump from screen to screen via keyword, backtrack through previous screens, and set bookmarks on particular screens of help.

INCLUDED APPLICATIONS. As always, Windows comes with a set of applications. It now comes bundled with Paintbrush, which is much more sophisticated than the old Windows Paint; Write, Terminal (which has been rewritten), Clock, Cardfile, Notepad, and Calculator (which now also includes a scientific calculator).

Perhaps the most significant new accessory is Recorder, which creates macros that you can then use in Program Manager, in any Windows application, or even *across* Windows applications. You can create several different files of macros, merge these files, and change the speed of playback; you can also set up macros in a continuous loop. However, you can't edit these files.

CONCERNS. The biggest concerns about Windows deal with the old Windows applications that haven't been updated yet; and even third-party drivers, which need to be adapted to run properly with Windows. (See "Windows Drivers for Printers," Page S32.) Windows 3.0 won't work with the current network shell (IPX) from Novell Netware, although an update is now available; you'll also need a new network shell or additional software to get it to work with LAN Manager 1.0 or Banyan Vines (see "Has 3.0 Made the Connection?" Page S23). Such shells should be available very soon. You'll also have to use the new versions of the Himem.sys and Smartdrive drivers, but these come with Windows 3.0.

This concern is likely to be less of a problem over time, because the proper drivers and applications will ultimately appear. But Windows will continue to pose a problem for people who have older systems or who don't have much hard disk space. While you can run Windows on an XT, it is extremely slow and cumbersome. Even on a standard 8-MHz AT-class machine, we found it rather sluggish — although this did improve significantly with extended memory added. Windows requires a large amount of hard disk space — 4½ megabytes of free hard disk space to install it and its included utilities, not counting other applications. By eliminating some features, such as background art, you can pare Windows down to under 2 megabytes. Add to that a few large applications, like Excel, Designer, Pagemaker, Packrat, Ami Professional, or Word for Windows, and you'll find the applications and environment can take up a lot of disk space.

THE IRONY OF THE PAST. Windows' history is ironic. We were cleaning out some offices and came across the original press release for Windows, which said the environment would run on a 192K, dual floppy 8088-based PC, and a letter from Microsoft senior vice president Steve Ballmer that said you would be able to run Windows and a graphic application both within 256K. That was never really possible, of course; you always wanted at least a 286, 640K, and a hard disk. But it's interesting to note how the hardware requirements have grown. On the other hand, Windows 3.0 offers many features — including protected-mode operation, virtual memory, and font support — that we doubt even Microsoft envisioned in those days.

In fact, in many ways Windows 3.0 offers most of the features that were originally promised for OS/2 and PM. It has the same basic user interface — including an emphasis on graphics — allows applications to use protected mode, and offers real multitasking and virtual memory on a 386.

In fact, Microsoft has even said it hopes to make Windows 3.0 applications run directly under future versions of OS/2.

Previously, even many people who ran Windows applications, such as Excel and Pagemaker, looked at these as stand-alone applications. But with Windows 3.0 offering better multitasking, improved memory management and a more graphical user interface, many people will find Windows to be an environment they can stay in.

Windows 3.0 may well become the standard operating environment for the next several years — at least until OS/2 is much more stable and compelling OS/2 applications appear. While character-based applications won't disappear, many PC users will finally enter the world of graphics once and for all. □

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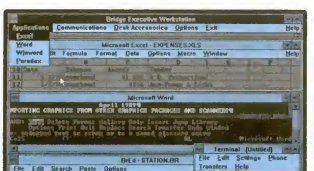
Bridge is an interpreted batch language that actually



In this Executive Workstation, Bridge integrates Windows and DOS productivity tools to enable a manager to manipulate information and fully exploit the power of Windows 3.0.

controls Windows and DOS applications. It is ideal for creating Windows front ends for testing, prototyping, communications, and other DOS or Windows applications. With Bridge, you can put keystrokes to an application just as though a user were typing. Bridge transfers information between applications using DDE for Windows and its own mailboxing scheme for DOS – so DOS and Windows applications share data and information. Bridge also supports Dynamic Link Libraries for incorporating existing C code.

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Bridge's interactive editor makes creating point-and-click user interfaces that launch and control multiple applications from a menu or icons easy. It will even automatically generate the Bridge code for dialog boxes.

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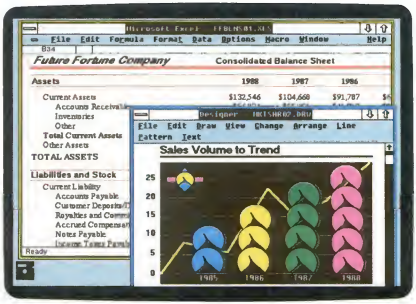
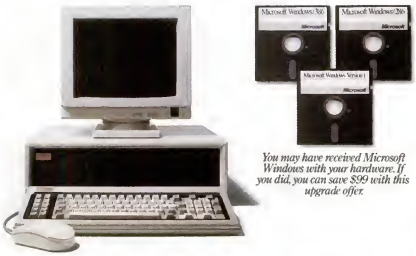


If this looks like your current version of Windows, you can upgrade for just $50.



You may have received Microsoft Windows with your hardware. If you did, you can save $99 with this upgrade offer.

Check out your software because if it works within a Windows environment, you're in luck.

If you are using Microsoft® Windows,™ the best thing about this offer, besides the special upgrade price, is that you'll now have access to all the memory in your PC. Not to mention that you can keep using your existing MS-DOS® applications, multitask with other Windows applications, and network more easily.

All the popular Windows applications have already been updated to utilize Windows 3.0's powerful capabilities. And most are offering low-cost or free updates. So if you have any version of Windows—including runtime Windows—give us a call. We'll upgrade your copy of Windows, help you update your applications, and answer any questions you may have.

But make sure and call for your $50* Windows upgrade before September 15, 1990. You'll save $99 off the suggested retail price of $149. And you'll be using Windows 3.0. Which will make you look great.

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MEMORY MANAGEMENT

Windows Makes a Comeback, Addressing Its Memory Problems

Managing memory has arguably been the biggest thorn in the side of Windows users since the product's inception. As Windows takes up a large amount of memory, people have had to devise ways of getting around memory constraints to take advantage of some of Windows' touted capabilities, such as running multiple programs and using Dynamic Data Exchange (DDE) to create hot links between the applications. Until Windows 3.0, "out of memory" messages popped up out of nowhere all too frequently and slow operations due to low residual memory were the norm.

Critical to its success, Windows 3.0 has addressed many of these problems. While its hardware needs are relatively demanding (to use Windows, 1 megabyte of RAM is recommended on a 286 system, and you'll be better off with about 4 megabytes of RAM on a 386), it now uses the space in an efficient, streamlined manner. It used to be that running more than one large application (such as Pagemaker or Ami Professional) with 1 megabyte of RAM was impractical, if not impossible; the system slowed down too much, or you ran out of memory if you had a few other desktop accessories loaded. Thankfully, such is no longer the case.

Understanding how Windows works now vs. its operation in previous versions will be easier with a little background on how memory works.

EXTENDED, EXPANDED — I'M SO CONFUSED!

There are three essential "modes" of memory with which you should be familiar: conventional, expanded, and extended. What are the differences?

Conventional memory: DOS was created with Intel's 8086 microprocessor in mind, akin to the 8088 in the XT in that it only uses 1 megabyte of RAM. A further limitation was that the space between 640K and 1 megabyte was reserved, which IBM set aside for things like ROM BIOS, memory-mapped video, and room for future growth. The result of this was that virtually all applications were limited to using the 640K, which came to be known as "conventional" memory. In newer processors that have more memory capabilities (such as the 80286; see below) this memory has come to be called "real" memory.

Expanded memory: When Lotus, Intel, and Microsoft addressed the problem of expanding memory beyond this 640K/1-megabyte limit, the resulting standard was "expanded" memory, also known as LIM or EMS (Expanded Memory Specification) memory. You added expanded memory to your computer using either hardware (expanded memory boards such as the RAMpage board) or software (memory managers such as Qualitas' 386 Max or Quarterdeck's QEMM) that emulated expanded memory using extended memory. Windows 3.0 now includes Microsoft's 386 expanded memory manager, Emm386.sys. Expanded memory is used by some Windows products, such as Excel, as well as some non-Windows applications you may run in Windows.

EMS lets programs retrieve small, 16K "pages" from a larger block of memory. One problem with expanded memory, however, is that it only provides for a maximum accessible memory area of 64K — four of the 16K pages.

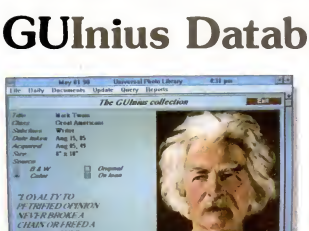
This limit, too, was overcome. To increase the number of accessible pages, EMS' capability was upgraded to allow up to 64 "mappable" pages (64 16K blocks adds up to 1 megabyte of space). In this way, programs can be mapped in and out of memory quickly.

Extended memory and the 286 and 386: The 80286 processor greatly improved upon the 8088 and 8086 chips, with the capability of accessing 16 megabytes of memory without having to resort to EMS hardware. The 15 megabytes above the first, if available on the machine, is called "extended memory."

The problem with this is that in order to use extended memory, the system has to be specially configured so that it can use a "protected" or "virtual address" mode that won't work with most applications. If you do this, it is difficult — if not impossible — to access the compatible, or "real," mode without resetting the processor. Windows *only executes* from extended memory, if it is available, which overcomes this problem. This is different from the software memory managers used with earlier versions of Windows, such as QEMM or 386 Max, which took extended memory and converted it into expanded memory.

One reason the 80386 was created was to overcome these processing inconve-

GUInius Database Solutions



Design forms that integrate directly with the database. Use radio buttons and check boxes for clarity. Work with forms under pushbutton, pull-down menu or function key control.

Ease of learning. Elegance. Consistency. The benefits of graphical user interfaces (GUIs) are clear. And now with *Windows 3.0*'s large memory space, you can switch between applications *instantly.*

Precision Software predicted the move to GUIs a long time ago; that's why we developed *Superbase 4*. It's simpler to learn than character-based systems, yet its potential for building integrated so1utions leaves older development databases standing.

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Superbase 4 gets you up and running quickly. Windows-style pull-down menus and pop-up dialogs give interactive access to a vast range of options. Import and export data in all popular formats; include images as data objects; print personalized letters and labels. And browse quickly through selected data using the intuitive VCR-style controls.

Powerful forms design

Superbase 4's highly visual approach makes form design fun as well as productive. Create presentation-quality forms to integrate directly with the database or even with existing dBase® systems. Introduce logical objects like command pushbuttons to build up complete applications. The forms designer delivers concentrated development power, without programming.

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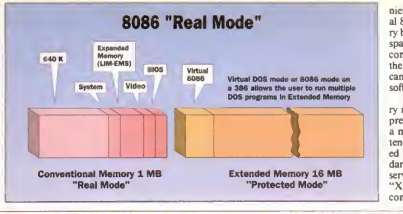

niences. Applications can run in a "virtual 8086" mode that lets extended memory be mapped into the conventional 640K space. Also, the extended memory can be converted into expanded memory. With the multitasking capabilities of a 386, you can run multiple DOS sessions using software such as Omniview or Desqview.

Windows includes an extended memory manager, Himem.sys, that was also in previous versions of Windows; it provides a memory management protocol for extended memory, XMS, much as expanded memory drivers create the EMS standard. Gary Saxer, director of technical services at Quarterdeck, explained that "XMS is a method or standard used for controlling the first 64K of extended memory [also known as HMA], extended memory allocations, and for controlling memory between 640K and 1,024K [upper memory]." The Windows 3.0 setup program installs Himem.sys automatically. It also automatically installs Smartdrive, which is a disk-caching program that works with extended and/or expanded memory; it reduces the amount of time it takes for an application to read information from your hard disk.

MEMORY AND WINDOWS APPLICATIONS. With Windows, you can launch and run multiple Windows and DOS applications on 286 and higher machines. Windows provides direct access to extended/protected memory in addition to virtual memory on 386 and higher machines. Windows 3.0 also uses expanded memory.

One problem with moving from applications running under previous versions of Windows to Windows 3.0 results from the fact that protected mode demands much stricter programming specifications; in protected mode, an application cannot use certain programming niceties (such as segment arithmetic). As a result, the only way "old" Windows applications can run under Version 3.0 is in "real mode" (accessed by starting Windows with WIN/R instead of just WIN).

Applications developed with the capabilities of Windows 3.0 in mind have been programmed to work with protected memory. If you try to run an older version of a Windows application under a "normal" Windows 3.0 mode, you'll get a message recommending running the application in real mode. You can call the Microsoft Windows information line at (800) 323-3577 to get more information on specific application compatibility status.

RUNNING DOS UNDER WINDOWS. You could run DOS applications from within previous versions of Windows, but you hit a memory ceiling fast — if the programs fit in memory at all. You can also run DOS applications with Version 3.0, but memory limitations are much less trouble.

When you use a DOS program under Windows but not in a 386-specific mode, Windows suspends the operation and execution of other Windows programs. If you're in a 386 enhanced mode, it runs DOS windows in virtual mode to give each DOS application its own 8088/8086 virtual system. You can then multitask these programs with other DOS applications; they continue to run even if you've minimized them as icons. You can run them in windows or in a full-screen mode that looks like a regular DOS screen.

DOS applications that access protected mode may have problems running from Windows. Some of these applications may run if you're running Windows in real mode, and there are new specifications emerging that will change this limitation, such as the DOS protected mode interface (DPMI); Windows 3.0 was designed to comply with this.

You've always been able to set up a program information file (PIF) to run DOS applications under Windows. This is still the case, and there is now a special PIF editor that lets you change several parameters. You can change the background/foreground priority to specify how much processor time an application should receive relative to other applications; you can specify how much expanded as well as XMS memory (which helps real-mode applications access extended memory) should be used with applications; and upper/lower limits can be set.

Windows users have waited a long time for a version that handles memory properly and realistically runs multiple applications. With Windows 3.0, it's here.

— *Serge Timacheff*

APPLICATIONS

Upgrade Policies for Major Windows Products

This list includes the upgrade policies and compatibility to Windows 3.0 of a selection of major/mainstream Windows applications that were also available running under Windows, Version 2.11.

ABC Flowcharter
Roykore Inc.
2215 Filbert St.
San Francisco, CA 94123
(415) 333-7833
Flow charting software. Current price: $295; free upgrade.

Actor
The Whitewater Group
600 Davis St.
Evanston, IL 60201
(708) 328-3800
Object-oriented software development package for Windows. Current price: $695; $75 upgrade fee if purchased before 8/1?/90; free to Gold Support Plan members.

Adobe Illustrator,
Adobe Streamline
Adobe Systems Inc.
1585 Charleston Road
Mountain View, CA 94039-7900
(415) 961-4400
Illustration/drawing software (Illustrator); typographical software (Streamline). No upgrade schedule is yet available.

Ami Professional
Samna Corp.
5600 Glenridge Drive, Suite 300
Atlanta, GA 30342
(404) 851-0007
Office/professional word processor. Current price: $495; if purchased before mid-May, $10 upgrade fee.

APE-A Programmable Emulator
HI-Q International Inc.
1142 Pelican Bay Drive
Daytona Beach, FL 32119
(904) 756-8988
Communications software. Current price: $189; upgrade will be less than $50.

Archetype Designer
Archetype Inc.
100 Fifth Ave.
Waltham, MA 02154
(617) 890-7544
Desktop publishing software. Current price: $2,500; free Windows 3.0. upgrade.

Arts & Letters Graphics Composer/
Arts & Letters Graphics Editor
Computer Support Corp.
15916 Midway Road
Dallas, TX 75244
(214) 661-8960
Drawing/illustration software. Current price: $695; upgrade with Version 2.0 or later, $50; with any prior version, $99.

CASE:W
Caseworks Inc.
Dunwoody Park, Suite 130
Atlanta, GA 30338
(404) 399-6236
Software development tool. Current price: $795; upgrade to Windows 3.0, $200 (available 60 days after Windows 3.0 Software Development Kit is available).

Command Post
Wilson Window Ware
3377 59th St. S.W.
Seattle, WA 98116
(206) 937-9335
Windows utility. Current price: $35; upgrade to Windows 3.0, $15.

Corel Draw
Corel Systems Corp.
1600 Carling Ave., Suite 190
Ottawa, Ontario K1Z 8R7
Canada
(613) 728-8200
Drawing/illustration package. Current price (Version 1.2): $595; upgrade from 1.0 to 1.2 is $149; from 1.1 to 1.2, $99; free upgrade if purchased after 3/1/90.

Crosstalk for Windows
DCA (Digital Communications Associates Inc.)
1000 Alderman Drive
Alpharetta, GA 30201
(404) 442-4930
Communications software. Current price: $195; the current version, 1.1, runs under Windows 3.0 (this is a free upgrade from earlier Crosstalk for Windows).

Current
IBM Desktop Software
IBM Corp.
472 Wheelers Farms Road
Milford, CT 06460
(800) IBM-7699, Ext. 294
Personal information manager. Current price: $395; undetermined upgrade policy.

Da Vinci E-Mail
Da Vinci Systems
P.O. Box 17449
Raleigh, NC 27619
(800) DAVINCI
Electronic mail package. Current price: $1,145 for Windows version; $1,495 for Windows/DOS version; $95 upgrade fee to Windows 3.0 for server/individual user; $95 for current users; $1,145 for server license and $445 for eight-user kit; $150 for single user.

Dbfast/Windows
Bumbleben Software Inc.
4122 128th Ave. S.E., Suite 200
Bellevue, WA 98006
(206) 562-1157
Dbase compiler. Current price: $395; runs under Windows 3.0.

Drafix Windows CAD
Foresight Resources Corp.
10725 Ambassador Drive
Kansas City, MO 64153
(800) 231-8574
CAD software. Current price (Version 1.02): $695; $20 upgrade (to Version 1.1) for current users.

Dragnet 2.0
Access Softek
3204 Adeline St.
Berkeley, CA 94703
(415) 654-0190
Text database/search utility. Current price: $149; later upgrade will be $25.

Dynacomm Asynchronous Edition
Futuresoft Engineering
1001 S. Dairy Ashford, Suite 203
Houston, TX 77077
(713) 496-9400
Communications software. Current price (Version 2.1): $295; upgrade free to current users; $50 upgrade prior to 2.1.

HDC Windows Express,
HDC Windows Manager *(now called Firstapps)*
HDC Computer Corp.
6742 185th Ave. N.E.
Redmond, WA 98052
(206) 885-5550
Windows utilities and miniapplications set. Current price: $99.95 for each; upgrade to Windows 3.0, $19.95; free upgrade if purchased after 4/1/90.

Horizon
Form Maker Software Inc.
111 Schillinger Road S.
Mobile, AL 36608
(205) 633-3676
Forms automation package. Current price: $195; upgrade is free if under maintenance agreement; if not, it is $50.

Image-In
Image-In Inc.
406 E. 79th St.
Minneapolis, MN 55420
(800) 345-3540
Scanner/image-manipulation software. Current price: $795; $100 upgrade with a 60-day grace period as of May 22.

Macrocalc
Anderson Consulting & Software
P.O. Box 40
C-7-3 Cascade Drive
North Bonneville, WA 98639-0040
(509) 427-5335
Business/scientific calculator/construction set. Current price: $127; runs under Windows 3.0.

Micrografx Draw Plus, Designer, Graph Plus
Micrografx Inc.
1303 E. Arapaho Road
Richardson, TX 75081
(214) 234-1769
Drawing/illustration/graphing software. Current price: $695; registered users of version 3.0 will receive free upgrade; those not registered can register and receive a free upgrade. Users with previous versions can upgrade to 3.01 for $99.99. For Graph Plus ($495) and Draw ($229), current version is not Windows 3.0-compliant; however, it will run in real mode. There will be a Windows 3.0-compatible version available in the future.

Micro Planner
Micro Planning International
655 Redwood Highway, Suite 311
Mill Valley, CA 94941
(415) 788-3324
Project management package. Current price (Version 6.2): $595; upgrade is $10 plus old disk.

Microsoft Excel
Microsoft Corp.
1 Microsoft Way
Redmond, WA 98052-6399
(206) 882-8080
Spreadsheet package. Current version runs with upgrade released earlier in year.

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Microsoft Windows 3.0
Microsoft Corp.
1 Microsoft Way
Redmond, WA 98052-6399
(206) 882-8080
Operating environment. Product price: $149; upgrade from any previous full or run-time version of Windows: $50.

Microsoft Word for Windows
Microsoft Corp.
1 Microsoft Way
P.O. Box 97017
Redmond, WA 97052
(206) 882-8080
Office/professional word processor. Current price: $495; this version runs under Windows 3.0.

Omnis 5
Blyth Software Inc.
1065 S. Hillsdale Blvd., Suite 300
Foster City, CA 94404
(415) 571-0222
Object-oriented development system. Product price: $795. Upgrades are free to registered users of Omnis 5 DOS/Windows.

Packrat
Polaris Software
1820 S. Escondido Blvd., Suite 102
Escondido, CA 92025
(619) 743-7800
Personal information manager. Current price: $395; $695 for three-user version; $150 for extra users on network beyond three people; $55 per person for LAN version; $10 upgrade of most recent 2.0 version; $150 for upgrade to Packrat 3.0; $55 for upgrade from Version 2.0 to Version 3.0.

Pagemaker
Aldus Corp.
411 First Ave. S.
Seattle, WA 98104
(206) 622-5500
No upgrade policy or new product announced as of deadline; a new version of PC Pagemaker is expected to be released later this year.

Picture Publisher
Astral Development Corp.
Londonderry Square, Suite 112
Londonderry, NH 03053
(603) 432-6800
Image management and manipulation software tool. Current price: $595; will run under Windows 3.0 in real mode; new release available soon will use protected mode; upgrade free to 2.0 users.

Pixie
Zenographics Inc.
4 Executive Circle, Suite 200
Irvine, CA 92714
(714) 851-2266
Presentation graphics charting package. Current price: $295; Pixie 2.0 runs under Windows 3.0; upgrade to Version 2.0 is $60.

Project Outlook
Strategic Software Planning Corp.
150 Cambridge Park Drive
Cambridge, MA 02140
(617) 354-1504
Project management. Current price: $495.

Pubtech File Organizer, now called **CBM Desktop Office**
Publishing Technologies Inc.
7719 Wood Hollow Drive, Suite 260
Austin, TX 78753
(512) 346-2835
Windows shell/utility. Current price: $199.95; upgrade free if you purchased File Organizer within 60 days of release of 3.0.

Rumba
Wall Data Inc.
17769 N.E. 78th Place
Redmond, WA 98052
(206) 883-4777
Communications package. Current price: $595; upgrade to Version 3.0 is $50 per copy — waived for users who purchase Rumba for Version 2.0 before December 31.

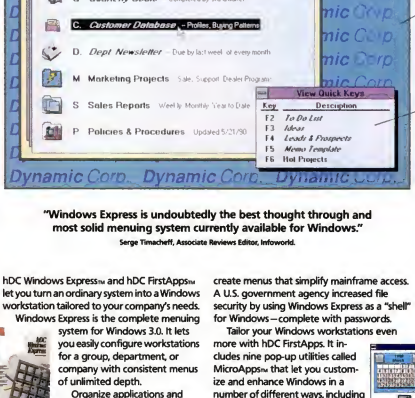
SQL Windows
Gupta Technologies Inc.
1040 Marsh Road
Menlo Park, CA 94025
(415) 321-9500
Database front-end package. No policy as of deadline.

Superbase 2 Windows, Superbase 4 Windows
Precision Software Ltd.
8404 Sterling St.
Irving, TX 75063
(214) 929-4888
Database packages. Current price: Superbase 2 is $295; Superbase 4 is $695; upgrades are free — instead, the company is encouraging users to donate to the Sierra Club, World Wildlife Fund, etc.

Viewpoint
Computer Aided Management Inc.
1318 Redwood Way, Suite 210
Petaluma, CA 94954
(707) 795-4100
Project management software. Current price: $3,500; if you bought Version 3.2 less than 90 days before Version 4.0 shipped, the upgrade is free; after 90 days, it is $350.

CA-Cricket Presents, CA-Cricket Graph
Computer Associates
10505 Sorrento Valley Road
San Diego, CA 92121
(619) 452-0170
Presentation graphics and graphing software. Product prices: $195 for Graph, $495 for Presents. No cost to upgrade from Version 1.2 of both to Version 3.0. Upgrade is also free if you have any versions of Xerox Presents and Xerox Graph.

Turn Microsoft Windows into your Windows.



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"Windows Express is undoubtedly the best thought through and most solid menuing system currently available for Windows."
Serge Timacheff, Associate Reviews Editor, Infoworld.

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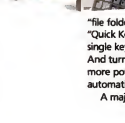

Organize applications and documents in any number of "file folders" for quick and easy access. Use "Quick Keys" to launch menu items with a single keystroke. Customize menus with icons. And turn Program Manager .GRP files into more powerful Windows Express menus automatically.

A major airline used Windows Express to create menus that simplify mainframe access. A U.S. government agency increased file security by using Windows Express as a "shell" for Windows—complete with passwords.

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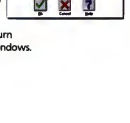

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WINDOWS UTILITIES

Filling the Gaps: Innovations and Enhancements

BY SERGE TIMACHEFF
WINDOWS SPECIAL EDITIONS EDITOR

While Microsoft has done tremendous work to improve Windows and its capabilities, there are, nonetheless, areas that cry out for enhancement or where a void of functionality exists. These opportunities attract and propagate Windows utility developers, who established themselves as important Windows vendors early in the game.

There are several types of Windows utility programs. Some of them you might use in conjunction with native Windows 3.0 accessories or utilities; an example of this is Eikon System's Scrapbook, which extends the Windows Clipboard's capabilities. Other utilities may commandeer the Windows interface so that you use them all the time by default, such as Publishing Technologies' CBM Desktop Office, which gives Windows 3.0 a Macintosh-like interface. Yet another type of utility provides one or more miniature stand-alone applications, such as screen savers, memory viewers, font viewers, screen capture, or calculators.

Here we'll look at the various categories of utilities. While not a comprehensive discussion of all current utilities available, here we categorize and discuss Windows utilities in general.

BUILDING ON A THEME. Is there a better way to do what Windows already offers, either by expanding a current feature or by writing a new program that outdoes one of the native Windows utilities? A number of vendors are banking on just that theory. "We allow you to manage images," said Karen Dyckman, manager of marketing and sales at Eikon. "There are lots of formats, and it's a hassle knowing what's what, so we let you manage everything in one file." Eikon's Scrapbook +, formerly sold by T/Maker Co. as Clipart Scrapbook, competes with packages such as Publishing Technologies' Multitack expander for the Windows Clipboard.

Dyckman also pointed out that because Windows now does a good job of handling memory, image archiving and management — which uses a lot of memory — has become a much more common and viable activity. As a result, increasing numbers of products will become available in the category. The same is true of graphics utilities for scanners, such as Wang's Image Wizard, which take advantage of Windows' streamlined memory management.

There are other stand-alone packages that focus on only one type of utility already found in Windows; an example of this is packages that have improved upon the Windows calculator. While Windows now has a simple calculator and a scientific calculator, alternative products nevertheless offer more. An example is Anderson Consulting's Macrocalc, which offers sophisticated calculator functions as well as "construction-set" capabilities.

Another program in this category is Publishing Technologies' Batchworks, which provides automatic macros and scripting development features. Windows includes macro features using the Windows Recorder, but Batchworks provides more sophisticated capabilities, such as allowing you to make new front-end dialog boxes for applications.

MINIAPPLICATIONS. Some packages provide one or more programs too small to be deemed full-fledged applications but too independent to be attached to another Windows function. These products are not to be found in the basic native Windows utility set. Anderson Consulting's Tiffany, Eikon's Scrapbook +, and Halcyon's Dodot, for example, all provide screen capture capabilities — they let you store a Windows screen in a .PCX or TIFF file, for example. They also commonly add other capabilities, such as Dodot's extensive file conversion features.

Backup for Windows, a $129 backup utility from Distinct Corp., features extensive tree-viewing capabilities that let system administrators backup data for multiple Windows users.

Some utilities come in the form of a set of miniature applications. HDC's Firstapps (formerly HDC Windows Manager, one of the most popular utilities for Windows 2.11), for example, contains a selection of "miniapps" such as a memory viewer and a customizable start-up screen. Okna's Desktop Set is another product in this category; it includes micro applications not found in Windows, such

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as an expense ledger and a file viewer, in addition to variations on other Windows applications like a calculator that also acts as a scaled-down spreadsheet.

A SHELL'S SHELL. Perhaps the most exploited and noticeable type of Windows utility is the category you might call Windows "shells." Windows already possesses some attributes of a DOS shell, but products such as HDC Windows Express, CBM Desktop Office (formerly the Pubtech File Organizer), and Wang's

An example of a utility that migrated from Windows 2.11 (top) to 3.0 (bottom) is Publishing Technologies' CBM Desktop Office, formerly the Pubtech File Organizer. It effectively takes over the Program Manager and makes the Windows interface more Macintosh-like in functionality and design.

Clearview effectively use Windows and alter the interface (often, but not exclusively, making it more iconographic or Mac-like). These Program Manager extenders theoretically provide more intuitive and easy-to-use interfaces for navigating Windows and using various applications. While the Program Manager is a great improvement — the Windows 2.11 MS-DOS Executive provided no effective way of grouping applications in one easy-to-use area — utilities still provide useful alternatives and enhancements, such as giving you more ways of organizing directories and files, or by altering the interface.

ADS' Windows Workstation, while primarily a networking add-on, also provides shell and utility features to Windows. It also contains features useful for any Windows user, such as a screen saver and menuing enhancements. (See "ADS Utilities Address Windows 3.0's Network Shortcomings," Page 529.)

While Windows now includes a directory tree in the form of the File Manager, many third-party vendors that offered directory trees for Windows 2.11 continue to market their updated products essentially as File Manager extenders. Wilson Window Ware's Command Post, for example, still offers directory-tree features as part of the program, which is a collection of Windows utilities (such as screen blanking, window locater, etc.).

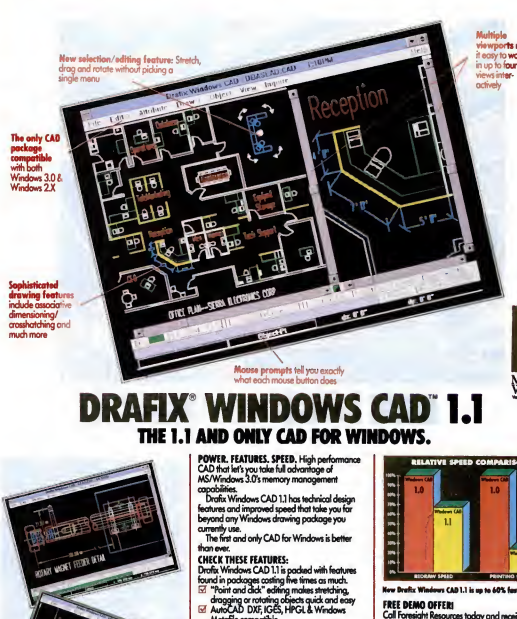
CHANGING WITH THE TIMES: THE VENDORS' VIEW. You might think that the highly touted Windows 3.0 has made obsolete a large number of utilities that were important for earlier Windows versions, but that's not entirely true. A few utilities *have* ceased to be useful; one such package is HDC Windows Color, which added the capability to display 16 colors in Windows instead of the old versions' limitation of eight. Windows 3.0 now lets you display 16. Another product you won't be seeing again soon is Distinct Corp.'s File Manager, which is not currently being upgraded; instead, the company is focusing on its completely new product, Backup.

Utilities developers have been forced to change with Windows 3.0. Vendors have had to respond to a new set of demands and look for ways to improve upon new Windows features.

"The playing field hasn't changed that much for Windows utilities," said Morrie Wilson, president of Wilson Windows Ware. "We still need Scrapbook and Command Post-type applications; just because Microsoft gives you some new stuff doesn't mean you don't want something else or more."

HDC Windows Express, a Windows "shell," is a menuing system and system administration tool optimized to improve and streamline the Windows interface by turning it into a text/icon-based, highly customizable menu. "The area of utilities is going to get grayer and grayer," said Brian Conte, president of HDC. "For example, it's a pain to switch applications, so you add as much functionality as you can to an application. The model of utilities has shifted from DOS to Windows, and it is changing from [previous versions of] Windows to Windows 3.0. The way Windows 3.0 manages memory helps; originally, we were limited in the number of utilities we could offer in one package, and now we can add more." HDC is adding features like additional disk and network management support.

Even with the Windows 3.0 enhancements, HDC finds plenty of opportunity for its product. "The Windows 3.0 Program Manager is hierarchical, and applications always follow [file] folders, for example," Conte said. "We provide arbitrary nesting folders and applications at every level." This flexibility improves Windows' ease of use, he said. □



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WINDOWS AND NETWORKING

Has 3.0 Made The Connection?

BY JODI MARDESICH
NETWORK SPECIAL EDITIONS EDITOR

Even though networks are notorious for being difficult to install and maintain, most users don't need to know about that. One of a network administrator's primary goals (after getting the network up) is to create an environment that is easy to learn and use. Users require a stable environment that gives them access to the applications and resources they need.

With the growing acceptance of graphical user interfaces, particularly Windows, and the prevalence of networks in the corporate environment, naturally network administrators began to use them together. Windows' mouse-driven, pull-down menu interface could rescue users from the unfriendly DOS prompt; the consistency of operation among Windows applications made it easy to train users, because once they knew how to use one application, learning another was simpler; and multitasking and Dynamic Data Exchange (DDE) promised greater productivity.

Unfortunately, mixing Windows and networks was like mixing oil and water. Due to memory constraints, some of the benefits the Windows environment promised — namely multitasking and DDE — were difficult to realize. Once DOS, Windows, and the network shell were loaded, little room was left for running applications. And if users couldn't run more than one application at a time, how could they multitask or take advantage of DDE?

A NEW WORLD. Those problems are disappearing with Windows 3.0. because Microsoft has made the program much more network-aware. Windows now has network options, so users don't have to exit Windows to do common network tasks such as attaching to servers or changing drive mappings. But the change in Windows that affects networking the most is Windows' memory capabilities.

Windows 3.0 gives programs direct access to protected-mode memory, which means that on a 286 machine, programs can directly address up to 16 megabytes of contiguous memory, and on a 386 machine, up to 4 gigabytes. A 386 machine can also take advantage of virtual memory (RAM emulated on disk). Users can still use expanded memory, according to Celeste Boyer, Windows product manager.

"With expanded memory, we could get you 64K page frames. That was nice, but we needed to address the voracious memory requirements of Windows," Boyer said. "Protected mode was the only scheme that could deliver."

"Memory utilization is a lot simpler now," said Jim Canning, senior systems analyst with FMC Corp. of San Jose, California. "Knowing that was coming gave us the impetus to stay with Windows."

Windows 3.0 also gives users with 386 machines access to more memory through "swap files," which are temporary files to which Windows will swap portions of programs not in use. "Windows treats it as if it's actually memory," said Stan Levine, vice president of engineering at Automated Design Systems (ADS) of Atlanta. "You could load every application that comes with Windows, plus Word, Excel, and a 3270 emulator in a machine with 4 megabytes of RAM and a 3-megabyte swap space and it will still say you have 4 megabytes of memory left. And the applications will run three times faster than they would before."

WHERE TO PUT IT. One question an administrator needs to answer is where to put Windows — on the server or at individual workstations? In previous versions of Windows, some users preferred to install Windows on workstations' local hard disks for performance considerations.

But despite the traffic it adds to networks, the most convenient way to install Windows is to put it and its applications on the server. "We prefer to load Windows on the server and pull it across the network," said Cheryl Currid, director of applied information technology at Coca-Cola Foods. On a large network with 1,000 workstations, it would be an administrator's nightmare to have to update Windows or other applications 1,000 different times whenever a change needed to be made.

To install Windows, the administrator creates a directory and copies all the Windows diskettes to that directory. The administrator must also create a directory for each user, either on the file server or on the user's local hard disk. By running the Setup utility with the parameter /n (for network), Windows copies network, mouse, and video adapter drivers to users' directories. Windows also puts the WIN.COM, WIN.INI, and SYSTEM.INI files in users' directories.

Many network administrators said they prefer the users' workstations to be diskless. "A lot us with large networks have learned we don't want to support local hard disks. It's easier to support hardware and get it right in a central location and keep it there," Currid said.

"It makes no sense to have a hard disk," said Steve Morse, a senior technical officer at Manufacturers Hanover Trust (MHT), in New York. "People don't back up their hard disks. And this way, we only need to keep around one copy of Windows."

Diskless workstations are also less expensive and add security to a network because users can't load any software onto the network or steal software. However, there are drawbacks. If the network goes down, users are out of luck.

In the past, using diskless workstations on a Windows LAN was problematic, because of the traffic it created over the network and because it was very slow. Canning, who supports diskless workstations on his network, said performance suffers when diskless workstations are used. "We had to resort to RAM disks," he said. "RAM disks are the worst way to use memory," Levine said. "It looks like a disk drive, but has no seek time, so you can get tremendous performance out of it. But you've used up your memory, even when it's not being used. It's very static, not dynamic."

Windows 3.0 will most likely do away with the need for RAM disks, Levine said. Will putting swap files on the server be an efficient way of making more memory available to users on diskless PCs? Cheryl Currid is experimenting with putting swap files on the server, one for each user in that user's private directory.

"We don't have enough experience to tell how much traffic that will create," Currid said. "We're testing whether there will be a problem."

OUT OF THE BOX. In previous versions, Microsoft touted Windows as "device independent," meaning it included drivers for virtually any printer. With Windows 3.0, Microsoft aims to provide network connectivity out of the box for industry-standard networks, Boyer said. The networks supported include Novell Netware, Banyan Vines, 3Com 3+Open and 3+Share, IBM PC LAN, and LAN Manager and MS-Net derivatives. (For other networks, contact the vendors.)

During installation, Windows recognizes the existence of a network and gives a list of choices. All administrators have to do is click on the network they're run-

"You can take off-the-shelf applications and make them bona fide network applications."

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ning, and Windows installs the correct driver. "It knows you're installing on a network," said Mark Manis, a technical officer at MHT. "It installs the drivers, and gives you network options. It's the difference between a Model T and a new Mercedes."

There are strict requirements for developing drivers for Windows 3.0, according to JoAnn Rockwell, compatibility coordinator for Artisoft of Tucson, Arizona. "They have a DDE (Dynamic Data Exchange) requirement that allows multiple windows to be open at once," she said. Artisoft is considering developing a driver for Windows 3.0, and it would probably be available through Microsoft, Rockwell said.

NETWORK UTILITIES. Beta testers report that Windows 3.0 is very network-aware. Although in previous versions of Windows, users had to exit to DOS to do simple network tasks such as attach to a file server or map a drive, these and other tasks are menu options in Windows. "You can change network mappings, attach [to] and detach from servers, take in broadcast messages from the network or reject them," said Morse. "Windows and the network work together now."

"Some of this stuff was available with Windows 2.X, but it took a rocket scientist to figure it out," said Currid. "Now you just read the screens, and point and click."

File Manager replaces the old MS-DOS Executive. It graphically shows available drive resources, and identifies which drives are local and which drives are on the network. (See Page S28.) By clicking on the icon associated with a drive, users can peruse a directory structure. This is a helpful feature, but when a user clicks on a volume, Windows scans the directories and subdirectories and assembles a list of the files on that volume. On a large network with thousands of files, this feature can be a problem. "If you have a large server, with hundreds or thousands of directories, and you click on one of those, you might as well go to lunch," said Levine.

DDE: A REALITY. "With Windows 3.0 coming up, multitasking is becoming real," Morse said. "You can keep a multitasking environment going, including DDE. Up to now it's all been talk."

Now that users can realistically run more than one application at a time, DDE will increase productivity and introduce new capabilities in workgroup situations, developers said. DDE is a protocol in Windows that allows applications to exchange information in real time. "It's a way of sharing information between applications in the Windows environment," said Eric Brooks, vice president of operations at Netlogic Inc., in New York City. "It allows you to think about the information being processed, not the application generating the information."

Brooks gave an example of a company that used a Microsoft Excel spreadsheet to trace its financial information. In Word for Windows, the company has a document that summarizes the current state of the company. Instead of putting a number in the Word document that represents the financial information, the document could have a reference to a cell in the Excel spreadsheet. When the spreadsheet is updated, the financial information in the document is updated also. Linking these documents with DDE saves disk space and also gives users real-time access to information.

Those benefits take on another dimension when present on a network. "If you take the concept of applications talking to each other a step further in a network environment, you have the ability to tear down the hardware wall and actually view information on a network as just one big Windows environment," Brooks said. "With network DDE, you can have an application running that Excel spreadsheet, and it doesn't have to be on your PC. You can now do it anywhere."

BEYOND THE LAN. Communicating outside the local area network is becoming easier and more reliable with the new release. Windows 3.0 is a much more stable environment for LAN-to-host connectivity, developers said. "Windows 2.X didn't guarantee access to the [3270 hardware]," Levine said. "Windows 3.0 uses device drivers to communicate with the hardware."

"Windows 3.0 is a systems integrator's dream," Levine said. "The message is you can take off-the-shelf applications and by doing some systems integration, you can make them bona fide network applications that talk to mainframes and database servers," he said. This linking could be done by writing a DDE module, using remote procedure call (RPC) tools.

Development tools such as SQL Windows, from Gupta Technologies Inc., stand to benefit both professional developers and in-house programmers. SQL Windows is a tool for creating Windows-based front ends to SQL databases, including Gupta's SQL Base; and databases from other vendors, including IBM's DB2. SQL Windows, a fourth-generation language and applications development system, can dramatically shorten development time, said Rod Zimmerman, Gupta's SQL Windows product marketing manager. "SQL Windows allows more people to be involved in developing applications, instead of just programming gurus," he said.

In addition, systems integrators have been using Windows to make administrating a network easier. Phil Gilbert, managing partner at Gilbert and Associates, a systems integration firm in Pacific Palisades, California, has created systems using Saros Fileshare with Word for Windows as the front end.

Fileshare is an OS/2-based network file management application that sup-

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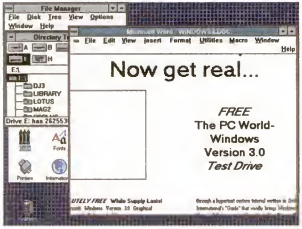

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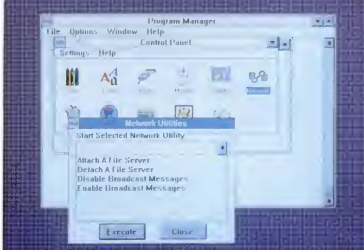


Windows 3.0's updated Control Panel shows a graphical listing of available local and network drives. Users can also connect and disconnect network drives.

ports Windows and DOS clients. File-share controls users' access to files on a network via Named Pipes and DDE. "The user doesn't have to deal with the network at all," Gilbert said. Network administrators can set up the appropriate rights and directories for users. Users enter Word, and create and save applications, but don't have to know where the files are stored.

Using Word for Windows' macro language, Gilbert said he utilized DDE calls to applications like Da Vinci's E-Mail, Polaris Software's Packrat (a personal information manager), Pioneer Software's Q+E, and Word. The bundle of applications is called The Windows Office Solution.

Gilbert and Associates also markets a similar package using Excel as the front end.

NETWORK VERSION. In the DOS environment, vendors traditionally have created stand-alone and network versions of applications. They created network versions of DOS applications such as Word Perfect for two basic reasons: so users could print to network printers easily, and so that users could share the application on a network without overwriting each others' work.

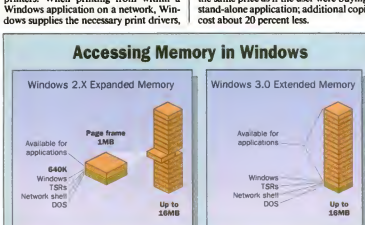
In the Windows environment, there are fewer needs for network-specific applications. First of all, because Windows is a device-independent environment, vendors don't have to write drivers for printers. When printing from within a Windows application on a network, Windows supplies the necessary print drivers, but the network sends the file to the correct destination. Thus, developers don't need to address printing in a specific network version of applications.

However, the need for file locking persists, so vendors such as Microsoft have added file locking to applications — in Microsoft's case, Word for Windows and Excel. Both products have built-in networking support, so users don't have to buy specific network versions of those applications, said Jeff Sanderson, group product manager for word processing at Microsoft.

Some vendors, however, including Polaris Software, have seen the need to come out with specific network versions of Windows applications.

Network versions of DOS applications also can save users money. They give administrators permission to put the application on a server, where it can be shared, usually by a large number of people. Some vendors charge a site license fee, usually substantially less than buying numbers of stand-alone applications. Other vendors charge a server fee and a reduced amount for each user on a network. For example, Word Perfect charges $495 for a stand-alone version; on a network, the server copy is $495 and each additional user is $295.

Microsoft doesn't differentiate its products into stand-alone and network versions, Sanderson said. When buying multiple copies of software for use on a network, the first copy of an application is the same price as if the user were buying a stand-alone application; additional copies cost about 20 percent less.



On a network, Windows quickly runs out of lower memory. Windows 2.X applications can access expanded memory by swapping out 64K page frames. In Windows 3.0, applications can directly access up to 16 megabytes of extended memory.

IN THE OLD DAYS. When Microsoft released the first version of Windows in 1983, networks were young and immature, and hadn't been widely accepted. Until now, Windows was an environment for stand-alone PCs. "The current [2.11] version of the product is just not network-aware," Microsoft's Boyer said. "We recognize that our target marketplace is a connected one; it's not stand-alone PCs anymore."

"Getting Windows 2.X up on a network was incredibly hard, and as soon as you went to run an application, you ran out of lower memory," MHT's Manis said.

With Windows 2.X, if users had 386 machines and weren't running Windows/386 but Windows/286 instead, they also had to use a DOS extender product like Qualitas' 386 Max or Quarterdeck's QEMM. With 286 machines, users would have to install an EMS card, which was expensive and difficult to configure.

Memory was so tight that network administrators would often resort to changing devices' memory addresses to gain additional memory. "We moved our network interface card to a part of memory that you don't usually use and that gave us an extra 64K. It may not seem like a lot, but it makes a huge difference," Manis said. "Now we can actually run Word for Windows and Excel at the same time [under Windows 3.0]."

"We haven't really pushed the network," FMC's Canning said. "One of the reasons is the difficulty with memory management. The machine has to be tuned perfectly to work properly."

WHY THE HASSLE? If Windows was so difficult to install and maintain on a network, why did network managers bother? Manis, who supports about 220 auditors at FMC, wanted to provide an easy environment in which they could learn and work. "The idea was to make them PC-literate, but we also wanted to make it easy for them to learn a new package," he said.

The environment Manis wanted to create for the auditors would integrate Word for Windows, Excel, and ABC Flowcharter into one linked document. "The problem was that you ran out of memory almost instantly," Manis said. "Windows 3.0 finally allows you to do true DDE. Before, it was too slow. Now, on a good 386, we're able to link Excel or ABC Flowcharter so that our users see one seamless environment."

"Despite it all, Windows was and is very powerful," ADS' Levine said. "Users were running against limitations of memory, but with the correct configuration, it would solve the problem. Once they got a hold of the mouse, they would suffer any kind of indignity to stay on the network. The people who persevered got tremendous rewards."

"Overnight, it takes Windows from being troublesome or problematic to the preferred network solution," Gilbert said.

ON THE ROAD TO PM. Another reason some network administrators have been gearing up for Windows is that they see it as a way to prepare for eventually moving to OS/2 and Presentation Manager (PM). "We think the corporation is going to go with OS/2 and PM, so we decided to start getting into that state with Windows, because we don't think PM is there yet," said Mike Damken, supervisor of MIS for Mobil's Paulsboro, New Jersey, refinery. Getting workstations ready for Windows is in most cases getting them ready for OS/2. Network administrators are starting with 286s and 386s and adding memory. "Paying the price today for memory is helping us to achieve our ultimate goal," said Caryl Holland, implementation manager with the Michigan Senate, in Lansing, Michigan.

WAIT AND SEE. Though the memory problem has been largely solved, according to beta testers for Windows 3.0, there were other reasons for hesitating to migrate to the environment. For example, most networks have a variety of hardware configurations — it's rare to find a network of all 386 workstations with VGA monitors. Running a network with a mixture of VGA, CGA, and EGA monitors, Windows 2.11 would have to be installed separately for each type of display, and the network administrator would need to make sure that users accessed the correct version of Windows when they logged in.

Windows 3.0 remedies this. In addition, if a user changes his or her video adapter, the administrator doesn't have to reinstall Windows for that user. The Setup utility has an option to change adapters by simply pointing and clicking to the new adapter — without having to reinstall Windows.

As Windows can recognize only three LPT ports and two COM ports at a time, networks are limited to five installed printers unless administrators install third-party print servers. That can be a limitation. "You can't natively share a local printer, but Windows will work with print server products," Levine said.

Most of these management problems seem to have been addressed with Windows 3.0, but some persist.

In Windows 2.X, the MS-DOS Executive graphically showed the drives available to the user. In Windows 3.0, File Manager goes even further, making it clear which drives are local, and which are network drives. By clicking on a drive, you can see a directory tree, including subdirectories and files. Though users can't access these files unless they have permission, some administrators don't want their users to even know the files are there. "I don't see any reason you should make this obvious," said Diane Danielle, manager of San Francisco-based Wells Fargo's finance LAN.

"Most users on my LAN don't know about any of the directories except their Home directory. This opens up the possibility of people starting to fool around with things they shouldn't," Danielle said.

Another inconvenience for network administrators is the way Windows 3.0's Program Manager launches applications. "Program Manager is literally brain-dead when it comes to networks," Levine said. When a user executes an application, Program Manager will put the user on the application's program directory. Users need to manually switch back to their home directories to prevent conflicting with other users. (See sidebar for help managing a Windows LAN, Page S29.)

One major roadblock to the acceptance of Windows on networks will be getting over Windows' previous ignorance of networks. "The product was designed for a stand-alone machine with a local hard disk and a printer attached to the PC," Danielle said. For instance, she's not jumping onto the Windows 3.0 bandwagon. "I'm waiting to see if 3.0 will fix the problems."

Besides being easier to install and use on a network, Windows 3.0 has another potential benefit: It could become the network administrator's choice for managing LANs. The ease of administering a Windows network is equal now to administering a DOS network, said Gupta's Zimmerman. "Before, it was harder to administer to a LAN with Windows. Now, there's no barrier to using Windows on a LAN." □

NETWORK UTILITIES

ADS Utilities Address Windows 3.0's Network Shortcomings

Although Microsoft has kept networking in mind in developing Windows 3.0, its network capabilities are far from perfect. Enter a group of utilities called Windows Workstation from Automated Design Systems (ADS) of Atlanta, which adds to the networking capabilities of Windows and eases Windows LAN management.

Windows Workstation, Version 3.0 comprises six modules: Workstation Menu, Print Manager, Secure Station, Workstation Intercom, Alarm Clock, and Workstation Meter.

One of the biggest benefits of the package is Multiset, a network script language that ADS includes with Windows Workstation.

Multiset adds networking and batch processing capabilities to Windows 3.0-compatible menu systems, including Program Manager, said Stan Levine, ADS' vice president.

Multiset aids central network management by allowing administrators to centrally change SYSTEM.INI files and WIN.INI files, as well as change keyboard, mouse, and video drivers. One glaring oversight in Windows is that when launching an application, Windows places the user in that program's directory. Network administrators can create Multiset scripts to launch programs and place users in the home directory. Multiset also allows scripts to pass environment variables and use branching logic.

CUSTOM MENUS. Workstation Menu lets network administrators create custom menus and submenus, in addition to context-sensitive help screens. The interface has been enhanced with a 3-D look and a richer color palette, said David Clarke, Windows Workstation product manager at ADS.

PRINTING HEADACHES. Windows now allows you to select printers and view print queues without exiting to DOS, but when you exit Windows, it forgets the printer configuration you've set up; consequently, you have to set up printers each time you log in. Setting up a printer from the Windows Control Panel takes at least 10 steps, Levine said, and users must have a knowledge of network print queues and printer ports. "Printer selection using Control Panel is an uncertain science," he said. "Users can send Postscript printer output to an HP LaserJet queue by mistake."

With Print Manager, system administrators can configure printers to correspond with the appropriate queues. When users want to select a printer, they simply click on an icon. Print Manager also remembers printer configurations. When users reboot or exit Windows, Print Manager re-establishes printer connections.

SECURITY. Secure Station addresses Windows' lack of security for network workstations, Levine said. The product protects a user's workstation so that it cannot be accessed without the user first entering a password. If someone makes five unsuccessful attempts at logging in, the system administrator will receive a notification. The module also provides file encryption and decryption.

MESSAGES. A new feature in Windows 3.0 is the capability to receive network messages from other users. On Netware, however, there is no Windows utility for sending messages to other users. In addition, receiving messages on Netware poses a problem. Incoming Netware messages halt operation of all Windows applications until the recipient clicks an "OK" button.

"If a congenial user sends the message 'Have a nice day' to all users on a LAN, Windows will suspend the execution of all reports, tape backups, and file transfers, which were pending to run over the weekend, until the staff returns on Monday to click the 'OK' button," Levine said. Intercom provides a way to send messages on Netware and also traps messages so they don't interrupt other Windows operations.

Another feature, Alarm Clock, lets users set up times to send messages or perform tasks like backups. Workstation Meter, a new module, monitors how many users are using applications and how long they are using them. Workstation Meter tracks up to seven software packages.

"It makes it easy to stay legal," Levine said. Future versions of the product will incorporate facilities for locking out users when the legal number of copies of an application are in use, he said.

— *Jodi Mardesich*

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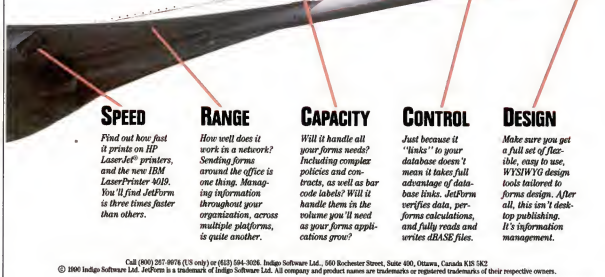

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DRIVERS UPDATE

Windows Drivers For Printers

BY MARK BROWNSTEIN
INFOWORLD LOS ANGELES BUREAU CHIEF

In a perfect world, everything goes smoothly: Newborns sleep through the night, the car always starts, and you always make more money than you spend. For software developers, the coding is right the first time and is bug-free. For hardware developers, a design works the first time it's plugged in.

And for a Windows software developer, you only have to worry about writing your application to Microsoft specifications, and everything attached will work. For hardware and peripheral makers, your product will always work perfectly under Windows.

But this utopia exists only in planning sessions and programmers' dreams. Software and hardware virtually never work on the first try.

THE THEORY BEHIND WINDOWS DRIVERS. It started out as a great idea. Microsoft Windows, all the way back to the first version, was supposed to be capable of managing the connection between the Windows applications and the devices connected to the computer.

Looking at the state of the art of the last 10 years, you can easily see how nifty a concept really is. Take any popular non-Windows word processor, desktop publishing package, or other application, and you'll probably find a core program and one or more install disks full of printer drivers. Since printer manufacturers have devised their own drivers in order to receive their own printing results, there is one simple way for an application to tell the printer how to produce the desired output. Using an Epson dot-matrix printer driver and printing to a Hewlett-Packard LaserJet printer, for example, produces unusable results. A large number of printers use their own proprietary command codes. For an application to accurately control any given printer requires a specific software printer driver.

The situation is a horrendous problem for many software developers, adding to the complexity and expense of developing applications programs, since most software developers have to write and distribute drivers for as many as 300 or more printers — although most users only require one, or possibly two, printers and drivers.

However, Windows manages printer drivers. As a result, all the Windows application needs to do is communicate in a standard way with Windows; when it comes time to print, Windows takes care of talking to the printer (or monitor, plotter, etc.).

Although most printers may require special drivers, a driver need only be installed once for Windows, rather than each time a new application program is used. All print requests go through the application to Windows, which routes the print instructions through the printer driver to the printer.

NOT FOR PRINTERS ONLY. Microsoft Windows does far more than merely talk to printers. It manages most I/O operations, sitting in the figurative center of the computer and acting as traffic cop for such tasks as controlling one or more displays, accepting keyboard and mouse (or other pointer) input, talking to serial and parallel ports, and handling the wide range of possible device combinations.

Again, in theory, Windows should be capable of handling all of the above. Writing software that runs under Windows is supposed to free the software developer from worries about such I/O related matters.

Most software developers trust Windows to worry about what type of monitor is being used, what kind of printer is attached, and whatever other system configuration variants are being used.

"The whole essence of Windows is a common set of guidelines, and we write to those, cross our fingers, jump around the desk, and hope it will work," said Bill Jones, Ami Professional product manager at Samna Corp. "We don't write any drivers at all," Jones said.

Not all software companies are putting as much faith into Microsoft's ability or willingness to provide the drivers needed to run their applications. Zenographics Inc., for example, has taken it upon itself to develop a new driver technology said to improve printer throughput to Laserjet, Paintjet, and other printers — especially ones that support color.

"Microsoft has never been in the driver business," said Bob Romney, president of Zenographics. The only drivers developed by Microsoft were "for mass quantity units — PCL [for Laserjet printers], Postscript, and that's about it [with the exception of a number of dot-matrix printers]," Romney said. "People who had color printers, which sold in much lower volume, were basically out of luck."

The question of who is responsible for writing drivers comes down to Microsoft, the hardware manufacturer, the software developer or, in an extreme case, the user. With the initial release of Windows 3.0, many devices will be supported by specially tuned drivers.

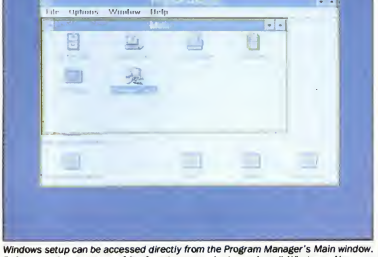
"If Microsoft thought it [a printer] was important enough, they would give it out with Windows," said Leland Ancier, president of Atech Software. He added that if a device was not supported by a Microsoft developed driver, however, the manufacturer has to develop the driver.

ORPHAN PRODUCTS. Not everyone is happy with the types or quantities of printer and monitor drivers produced by Microsoft, especially developers who make products that are less common. "Right now we're looking to [having drivers designed] by Microsoft or the device [manufacturers]," said Elmer Easton, president of 3D Graphics Inc., which is developing presentation products for other publishers. "We're only going to get into the driver world if we have to, because the others aren't doing it," Easton said. "Microsoft and the hardware people ought to declare themselves. Are they or aren't they [going to provide drivers]?" This can especially be a trade-off for companies that offer software packages designed to work with less common devices, such as slide generators or large-format plotters.

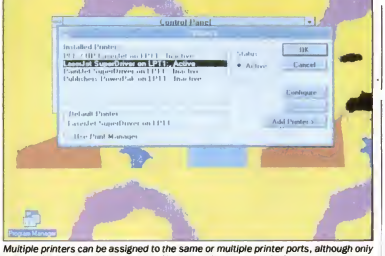
While a standard Laserjet printer and a plain-vanilla VGA display system can be installed using Windows 3.0 as it comes from the box, you can probably expect troubles getting Windows to work with antiquated or specialized products. Indeed, for narrow-market products, such as color printers, slide generators, or large-screen, high-resolution monitors, the hardware vendor typically provides special drivers. For example, Cornerstone monitors come with their own Windows drivers; if you currently have a Cornerstone monitor with a driver for Windows Version 2.11, it won't work with Windows 3.0. One is soon to be published, according to Cornerstone. This problem is common among Windows users with less common hardware, and the Cornerstone case is hardly isolated. Unlike earlier versions of Windows, Windows will not just be installed and lie unused on a valuable portion of hard disk; for many, it will actually become an important working tool. This means more users with specialized hardware will have to be served.

SO WHAT'S NEW? Nevertheless, there have been some definite improvements made in the way that Windows 3.0 manages drivers; for example, you no longer have to reinstall Windows just to change from EGA to VGA. Also, more drivers — such as for the HP Laserjet III and the Deskjet Plus — have been added.

Another area of improvement is in



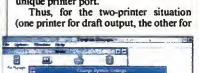
Windows setup can be accessed directly from the Program Manager's Main window. Before, to change many of its functions, you had to reinstall Windows. Now you choose the Setup icon to access various installation options.



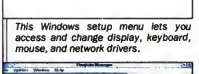
Multiple printers can be assigned to the same or multiple printer ports, although only one can be active on a single port. Note also that you can design your own screen background.

printer management. In all versions of Windows prior to 3.0, only one printer could be assigned to a particular port, even though several printer drivers could be loaded. In the rather common situation where two printers are connected by means of an A/B switch to a common printer port, using both printers posed a real problem from within Windows. Users were allowed to select an active printer from the Control Panel. However, each installed printer had to be assigned to a unique printer port.

Thus, for the two-printer situation (one printer for draft output, the other for final hard copy), only one printer at a time could be assigned to LPT1. Switching from the draft printer on LPT1 to the quality printer on LPT1 involved going in to the Control Panel, selecting the Connections menu, reassigning both printers (assigning the draft printer to a "None" printer port and the quality printer to LPT1), and then selecting a different active printer. This was a complicated task.



This Windows setup menu lets you access and change display, keyboard, mouse, and network drivers.



When you choose the "Display" option in the setup panel, it lists available video drivers.

Windows 3.0 provides a much more elegant solution. You can assign virtually as many printers as you have drivers for them to the same printer port. Thus, a laser printer, a dot-matrix printer, a color printer, and perhaps a plotter can all be installed and assigned to LPT1 (or any other valid printer port).

To switch from one printer to another, you'll still have to open the Control Panel. However, instead of juggling port assignments, you merely move the cursor to the desired printer, highlight it, and select the "Active" radio button to define the printer as the active printer; any other active printer is automatically deactivated. When a printer is active, Windows produces the code (using the driver) that is designed to work with the selected printer. The solution is *much* nicer and simpler than that provided in earlier versions of Windows.

System configuration (which involves setting up a variety of drivers) is also largely a point-and-click affair.

In Windows 2.11 and earlier versions, if you wanted to change video devices, you were required to completely reinstall Windows. The process involved considerable disk swapping and was a time-consuming process. Worse yet, changes to the Win.ini file that defined many of the features of your Windows installation could be changed or corrupted by the reinstallation process.

Windows 3.0 provides an update menu that allows you to change various aspects of a system configuration from within Windows. The menu, called Window Setup, allows you to choose a variety of options for display type, keyboard, installed network, and pointer type. A simple menu allows you to select the option you wish to change, scroll through a pick list, and select a new option.

Updates are still somewhat limited, however. In Windows 2.1 and lower versions, you always had to reinstall Windows when changing your video, keyboard, or other devices. Windows 3.0 allows you to change to any device on a list of standard devices.

Although Windows contains a fairly large number of drivers for mainstream products, to install devices for which Microsoft has not included a driver (with the exception of a printer) still requires reinstallation. Installing a nonsupported device requires telling Windows during the installation process that you are using another device — and then loading the driver from floppy or hard disk.

Adding a printer is somewhat simpler than adding the other I/O devices. As with Windows 2.11, a new printer can be added by selecting the "Add Printer" option in the printer setup menu and loading in the new printer driver.

As already mentioned, once a printer is added, port assignments are easy. Advanced setup options, such as font installation, printer memory setup, and other unique capabilities, are handled by the printer setup screens.

Special printer drivers must include code that provides options required for setting up the printer or printers controlled by the driver. Publisher's Powerpak, from Atech Software, is a software driver solution for Windows that provides support for more than 300 printers. During setup, you choose your printer from Publisher's Powerpak's own set of drivers, and then specify your appropriate

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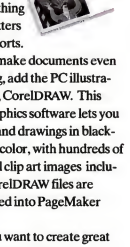

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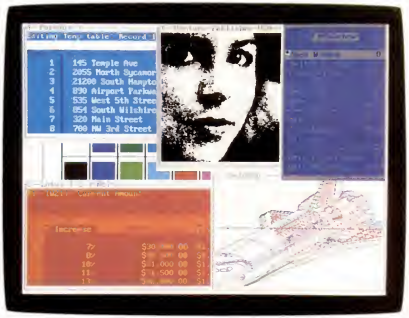
Multitasking



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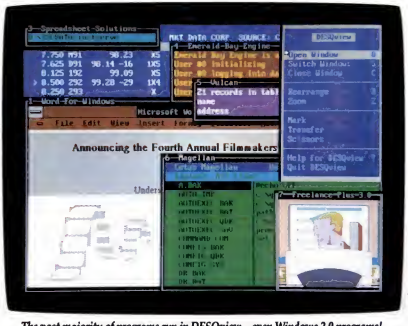

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paper handling and output controls. In addition, font installation and screen font creation are also selected using the menu. The setup utilities for each printer are provided with the printer driver. Although Microsoft has provided a standard set of installation screens, the option of providing different setup and configuration for a printer is provided, and can be managed through the use of a specially written driver.

UPGRADE CONCERNS. If you're changing from Windows 2.11 to 3.0, you may have a number of questions as to how your existing drivers will be handled. Fortunately, for most users with common hardware, the changeover is painless and relatively transparent. As discussed above, if you have specialized hardware for it, you may have a problem if no driver can be obtained for Windows 3.0 yet. Some Windows 2.11 drivers will run with Version 3.0, but others won't.

Windows 3.0 does many things differently from its predecessors. In Windows 2.11, developers had to cope with a 286 version that ran under standard DOS and performed no special memory management tricks, and with a special 386 version of Windows 2.11 that used protected mode and memory management.

Windows 3.0 operates in three different modes: "real" mode, which functionally operates as a 640K operating environment and performs no extended memory routines; "normal" mode, which performs memory management and uses the 286 protected mode; and "enhanced" mode, which works only on 386 and higher systems, and which implements 386 protected mode and virtual memory.

"There is an additional set of function calls that [a device] can make, allowing the application to perform some of the work for the user," an engineer at Atech Software said.

"Windows 3.0 drivers won't work with Windows 2, but some Windows 2 drivers will work with Windows 3.0," Atech's Ancier said.

Writing drivers that use your memory's real mode, while not trivial, is certainly a much less complicated task than developing them for the "normal" and "extended" memory modes accessed by Windows 3.0. But in spite of the relative simplicity of real-mode drivers, a number of factors contribute to making Windows 2.11 drivers essentially incompatible with Windows 3.0.

"Windows 3.0 drivers have to behave. [Driver designers] have to follow certain rules when writing [driver] code to run under Windows 3.0, so the device can run in protected mode and use the virtual disk [supported in the 386 enhanced mode of Windows]," Ancier said. "There's a good likelihood that the drivers for Windows 2 didn't follow those rules."

Publisher's Powerpak, a soft-font installation program, comes with its own set of more than 300 printer drivers selectable from within Windows.

> *"A laser printer, a dot-matrix printer, a color printer, and perhaps a plotter can all be installed and assigned to LPT1."*

Microsoft has made the specifications for drivers and applications written to run under Windows 3.0 available to developers as part of its Software Developer's Kit (SDK). They have also provided sample drivers, including source code, for drivers that will be included with the final shipping version of Windows 3.0.

In spite of the availability of information on the drivers and applications, the going has not been easy for many companies developing Windows 3.0 drivers.

THE DEVELOPER'S OBSTACLE COURSE. There are a number of hurdles developers must overcome in order to provide drivers that work with Windows. The three modes of the program provide a significant problem, because support for the 286 and 386 protected modes must be addressed in addition to the real mode. Provisions for virtual memory and for other peculiarities of each mode must be addressed by the developer.

Developing a high-performance video driver presents "quite a challenge," Zenographics' Romney said. "From what I've seen of the screen driver device development kit, it is at least twice as complicated [as the kit for Windows 2.11]," Romney said. "It will be a big challenge for all the video card people to come up with drivers equal in quality to those provided [by Microsoft] with 3.0."

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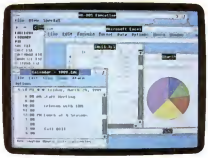

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Perhaps more challenging still are those devices that communicate at a level closer to the system bus. Pointing/input devices, floppy disk interfaces, and specialty boards (such as fax boards, video cards, etc.) provide additional levels of difficulty. Although Microsoft will ship drivers for the Microsoft Mouse, Logitech bus and serial mice, and a number of other relatively standard pointing devices, drivers for digitizing tablets, trackballs, and other pointing devices will not be included in Windows 3.0; the only way to use them is if they emulate an industry standard (such as Logitech or Microsoft mice).

In order to exploit the sophisticated and advanced features common to specialized pointing devices, hardware developers have to produce their own drivers and ship them with the product, or as upgrades to current products. "In pointing devices, I can see where you can get into a [more difficult development] area," said Tim Farrell, president of Futuresoft Engineering Inc., publisher of Dynacomm, a communications program for Windows. "You're dealing with the system down to the interrupt level, and I can see where [this would be more difficult]."

"When he started working on Windows 3.0 drivers, he had hair," joked Tim Berry, president of Microspeed Inc., which makes trackballs, about the programmer who was developing Windows 3.0 drivers for the company's devices. The problem was not merely a matter of difficulty in writing the drivers — Microsoft changed Windows enough during beta testing that previous drivers would no longer work with new versions. Other mouse vendors, such as Fremont, California-based Logitech Inc., make trackballs that are fully interchangeable with their mice, and thus avoid any problems.

Although development time for the trackball may not be an enormous problem for Microspeed, the company waited until a final, prerelease version of Windows 3.0 was available before writing a compatible driver. The company now has a driver compatible with Windows 3.0.

> *"Windows is a common set of guidelines, and we write to those, cross our fingers, jump around the desk, and hope it will work."*

Development of a future version of Norton Backup has also run into some snags. The version, which will run under Windows, used a large body of code from the current DOS version that was ported into Windows. However, developing drivers that ran inside of Windows and that could correctly talk to the floppy drives installed in the system was a different matter. Since Windows takes control over most of the system's resources, a considerable amount of coding was required to take control of the floppy drives and allow them to perform some of the speed optimization required for full performance by the program, said Kevin Azzouz, a developer of the Windows version.

Other problems arise when nonstandard devices are installed in a system. A prime example is Faxit, a software package that allows you to send documents produced within a Windows application as a fax. It supports a variety of fax boards and requires a special version for Windows 3.0.

The version of the product for Windows 2.XX supports the Intel Connection Coprocessor and a variety of other fax boards. Under Windows 3.0, however, some of the nonstandard functions of the boards pose a serious problem, said Tom Gray, director of engineering at Alien Computing, which publishes the product.

"We've discovered that we have to play some tricks in passing buffers down to the CAS [the application specification developed to support the Intel Connection Coprocessor]," Gray said. However, actually developing a driver to support the board "will be real straightforward," Gray said, adding that he hoped to have the CAS version running by the time of last week's announcement.

Other boards supported in the Windows 2.XX version of the product provide a greater challenge to support, Gray said. The "Xerox Micro Fax board . . . can cause a big problem because it's kind of weird," Gray said. "We may have to write a set of virtual device drivers so Windows knows how to access it."

THE LAST WORD. For devices not natively supported by Windows 3.0, manufacturers must provide drivers or risk being squeezed out of the market. This provides a windfall for many consultants who are developing drivers for the currently unsupported devices. It is also a cost of doing business for those developers who prefer to create the drivers in-house.

Windows 3.0 is seen as a viable target market by much of the computer industry. Although the task may be more difficult for some products than for others, it is clear that broad driver support can be expected in the very near future. For vendors of current unsupported hardware products that want to claim Windows compatibility, their work is clearly laid out. □

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USER CORNER

Users Have High Hopes for 3.0

BY ALICE LAPLANTE
INFOWORLD NEWS EDITOR

A year and a half ago, *InfoWorld* began researching what was considered a routine, management-oriented news story: calling PC managers and asking them what kinds of hardware and software they would most like to see at fall Comdex 1988.

The answers, from myriad geographic locations and industries, were strikingly similar — and completely unexpected: What the managers wanted were Windows applications. (See "PC Managers Looking for Applications Based on Windows," November 7, 1988, Page 12.)

A week later, Microsoft chief Bill Gates, addressing the Chicago Association of Microcomputer Professionals (CAMP) at its vendor fair, spoke about the astonishing sales figures of Windows over the past few months. Microsoft, he said, was shipping approximately 50,000 copies of Windows a month. Gates, however, could not give any definitive reason why Windows had suddenly caught on.

After all, the product was notorious in the industry for being "vaporware" for a whopping two years before it actually shipped. When it finally did get into the hands of users, it was generally greeted with hoots of derision. Who would buy an awkward PC emulation of what was already present and sophisticated on the Macintosh? And even more importantly, why would corporate PC managers spend the time and money to go to Windows when OS/2 and Presentation Manager were just around the corner?

The fact that few software vendors had committed to Windows also made it an unlikely candidate for a grass-roots best-seller: Theoretically, corporate end-users don't care about the operating environment, they care about applications. And in those early days, there weren't many.

Still, when asked after Gates' speech, CAMP members — who comprise PC professionals from the 200 largest Chicago-area corporations — were able to provide very definite answers as to why interest in Windows had suddenly blossomed. For one, they said, the idea of having a common user interface across all applications was very desirable, because it would eliminate many of their training and support costs. Secondly, Windows provided the as-yet-unheard-of idea that they could have the same applications running across all hardware platforms.

For example, they said, you could have end-users on Macintoshes, on machines running OS/2, and on machines running DOS and Windows, all with the same interface, the same command structure, the same functionality. That, they said, was very appealing.

Now, 18 months later, a different scenario is being played out. Users have been anticipating the shipment of the latest version of Windows for the better part of a year, and those developers smart enough — or lucky enough — to have put in the person hours of development time the Windows environment demands are finding themselves riding the crest of the next wave of microcomputing.

In fact, the level of enthusiasm on the part of Windows users and developers rivals that of early Macintosh groupies, with some people saying that Windows is going to be responsible for finally penetrating the desks of those end-users who have so far resisted the PC revolution.

Most interesting of all, the appeal of having the same graphics-based applications running on all hardware platforms has seemingly faded. PC managers are no longer talking (much) about immediate plans to implement OS/2 or expanding the role of Macs. Instead, they are putting their energy into implementing Windows as a corporatewide standard.

"It's taken a while for [Windows] applications to dribble out."

WPMA's Basil W. Maloney

GETTING RELIGION EARLY. Although Windows has only recently caught on in corporate America, there are a number of "super users" who recognized it as a winner early on, and acted accordingly.

Bill Cornfield, president of the Windows Support Group, in New York, was one of the few who recognized the potential impact Microsoft Windows could have on the industry. Formerly head of end-user computing for a large New York-based bank, Cornfield started his own company to act as consultant and developer of custom Windows application for Fortune 1000 firms.

"I recall back four and a half years ago, when the big debate was Topview vs. Windows," Cornfield said. "At that time, when I was doing consulting for Equitable Life, I came to the conclusion that Windows was a winner."

In addition, for a lot of technical reasons Windows was superior to Topview — IBM's short-lived graphical windowing environment that rapidly faded into obscurity — and there was the common user interface issue, Cornfield said.

"In retrospect it's funny," Cornfield said. "Microsoft barely advertised the fact that it was publishing a style guide, yet that was critical to the whole concept of the Windows environment, that developers would need to conform to a standard."

Another veteran Windows installation is at American Airlines, in Dallas, where 2,000 Windows workstations are installed as part of a corporatewide office automation system. Ultimately, the "Interaact" project, still in development, will have over 20,000 users throughout American, said Wayne Pendleton, managing director of the project.

"We're installing an office automation system that is multitiered, and at the desktop level runs under Windows with [Hewlett Packard's] New Wave," Pendleton said. The workstations run Microsoft's Excel as the standard end-user spreadsheet; Borland's Paradox as the standard database (which is *not* a Windows application currently); and Microsoft's Word for Windows as the word processor of choice, he said.

The decision to go with Windows was made well before Windows was accepted at the corporate level, Pendleton said. "We made the product selection over two years ago, and chose Windows because at that time there weren't sufficient application programs available in the OS/2 world. It just wasn't an option," he said.

Basil W. Maloney Jr., the executive director of the Windows and Presentation Manager Association (WPMA), based in Richardson, Texas, said that it is important to keep in mind just how recent the Windows phenomenon is.

"When Windows was first announced, it was really just a development environment, and the only people who bought it were those willing to play with it and take the time to figure it out," Maloney said. In addition, it has only been within the last 12 months that mainstream applications have been available for Windows.

"Word processors only began coming out eight months ago, databases six or seven months ago," Maloney said. "Communications products are finally reaching the market. It's taken a while for applications to dribble out."

WHAT EVERYONE KNOWS. The key selling point of Windows has been enumerated so many times that it is almost unnecessary to repeat. However: The overwhelming reason that PC managers are so attracted to Windows is clearly an ease-of-use issue, perhaps better classified as an *ease-of-learning* benefit.

Once users learn how to use one Windows application, they can virtually use any other one with only minimum training, due to the consistency of the

interface from one product to another.

But that doesn't tell the whole story. Most PC managers also point to Dynamic Data Exchange (DDE), which allows users to hot-link and dynamically exchange information between Windows applications.

In fact, *InfoWorld* recently completed an informal survey of readers in which PC managers and users were asked what Windows' most important characteristics were. By far the most popular responses were "ease of use" and "memory management on 386"; these were followed by multitasking support, speed on a 20-MHz 386, and ease of learning. (See chart, this page). Windows 3.0, therefore, is valued for much more than its pretty face, said PC managers.

Another important advantage is common device drivers, according to Julian Horwich, director of CAMP.

"Once you load a driver for a particular printer, all the packages running under Windows use that same driver, so you don't need to find a different driver for each package," Horwich said.

This doesn't mean that Windows is without its flaws. For one, at American Airlines, memory is still an issue.

"The memory capabilities of Windows 2.11, combined with the memory requirements of New Wave, made it difficult to run applications in the DOS environment," Pendleton said.

Windows 3.0 will eliminate a lot of problems, said Pendleton, adding that he thinks it will still be necessary to work with software vendors to try to reduce the memory requirements of their products. This is especially necessary in any programs that are terminate-and-stay-resident applications, he said.

"There's no free lunch," said CAMP's Horwich. "You don't want to have to swap in and out of memory — that would hurt the performance of the environment." Horwich and others also mentioned what has turned out to be the chief drawback of Windows: the difficulty in developing for the environment.

"There is definitely a longer learning curve for developing Windows applications," Horwich said. This has affected in-house applications development as much as development of commercial applications, he said.

"It takes a tremendous amount of time to do in-house development work," said American Airlines' Pendleton, who added that the Interaact project, in addition to the off-the-shelf Windows software, is developing packages itself. "There aren't a lot of development tools, so the going is very slow."

Although it isn't often discussed, there are end-users uncomfortable with the very graphical interface so touted as Windows' strength.

"Some users tell us that the mouse is not appropriate for this environment," Cornfield said. "For example, those people with limited desktop space don't care for it; neither do computer professionals who have long used the command line."

Still, Cornfield said, usually they come around. "At first, some people have a difficult time with the mouse, but after a while, they don't want to use the keyboard anymore," he said.

Another disadvantage to standardizing on Windows — one that is rapidly diminishing — is that there are still "gaps" in the applications lineup.

"And if an end-user does not find all applications work inside Windows, they will drop Windows rather than switch back and forth into DOS," said one Windows 3.0 beta tester. "It will be more of a bother than it's worth."

The beta tester, however, said there are far more Windows applications available than most people realize.

"It just hasn't been well publicized," he said, adding that that should change with Windows 3.0 debut, for which Microsoft has assembled an impressive line of vendors either already supporting or intending to support Windows.

INTEGRATION, NOT INTEGRATED. It's a fine distinction, said Cornfield and others, but one of the initial attractions of the Windows environment was that it offered the possibility of *integrating* applications, rather buying integrated products.

The difference is that for organizations standardizing on Windows, they can, in effect, have an integrated environment, where the components — be they word processor, spreadsheet, or database applications — are independent of one another, even though they look and act approximately the same way because they conform to the same user interface guidelines. Therefore, if a newer and better application in the same category comes onto the market, the user has the opportunity to upgrade to a better product without throwing away everything else.

"The file system, the error messages, the message boxes, all feel the same, so it forces the developers into a common human interface," said CAMP's Horwich. However, if someone commits to an integrated package such as Symphony, he or she is stuck with the components in that package, Horwich said.

"Frequently, the vendors sacrificed some capabilities to get the integrated effect, and in general, people ended up buying a different package for each function rather than make that trade-off," Horwich said.

"If someone comes out with a better spreadsheet, you can switch," said Windows Support's Cornfield. "This had and still has great attractions for end-users."

SPREADING THE WORD. In the days when Windows was newly born, Microsoft was virtually alone in its fervor to convert PC users to the graphical environment. With a few exceptions, such as Pagemaker, most software vendors made a half-hearted attempt to rally a certain amount of support, but Microsoft itself was the only developer who went into full-scale Windows applications projects.

The results of this were especially apparent in late 1989, when user interest in Windows — and the absolute lack of interest in OS/2 — could no longer be ignored by even the most resistant software developer. At that point — seeing the sales Microsoft and other firms were racking up in the Windows market — a number of software developers "rebelled," complaining bitterly that Microsoft had failed to make its priorities clear.

Microsoft had misled them into thinking that OS/2 was going to be the next major operating environment, they said.

The confrontation took place in September 1989, when a number of major PC software vendors attending Stewart Alsop's annual conference confronted Microsoft's Bill Gates and accused the company of having a "hidden agenda" with regard to Windows. Software Publishing's Fred Gibbons and Lotus' Jim Manzi were the most vocal expressing outrage that they had put their eggs into the wrong basket — in this case, OS/2.

Weeks of debate followed, during which the press, columnists, analysts, and vendors talked about whether Microsoft had made it clear enough that Windows was a strategic product.

But PC managers disagree with this assessment.

"Lotus found itself on the wrong side of the bed, thinking that Presentation Manager was going to catch on," said Steven Morse, senior technical officer for Manufacturer's Hanover Trust, a New York-based company that has standardized on Windows. "But why should users make plans to go to OS/2 when networking support, printer support, and applications aren't there? A lot of [software] companies made the same mistake."

However, PC managers do agree that outside of Microsoft, software developers were lukewarm about making development funds to Windows projects.

Windows Support's Cornfield said he went around the country, to user groups and trade shows, making speeches about the value of a common user interface.

"I spent 90 percent of my time explaining what Windows was, in speech after speech after speech. My goal was to put Windows on every desktop, before anyone had ever really heard of it," said Cornfield, who added that nowadays, that kind of promotion is not necessary, given the high visibility of Windows.

Manufacturer's Hanover Trust currently has over 1,500 copies of Windows installed in its end-user base. For manager Morse, the possibilities Windows offered were first glimpsed several years ago, when he saw an early prototype of Aldus' Pagemaker running under Windows.

"In the fall of 1986, I saw a very unstable beta version of Pagemaker that demonstrated the promise of Windows," Morse said. "In some respects, Pagemaker did for Windows what 1-2-3 did for the PC."

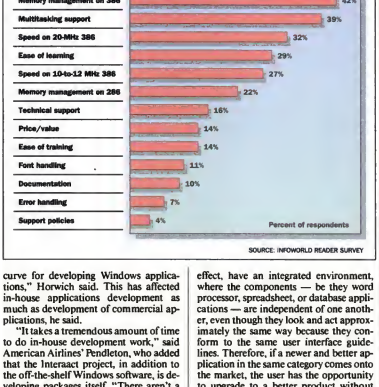
LOU NOVOTNY, CAMARA LARSON

"In some respects, Pagemaker did for Windows what 1-2-3 did for the PC."

Steven Morse

What Users Think About Windows

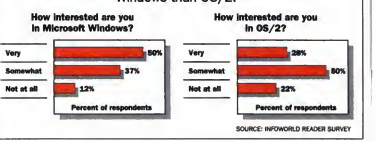
PC managers said Windows is much more than a pretty face, ranking ease of use and memory management as key advantages it offers.



SOURCE: INFOWORLD READER SURVEY

Readers Answer These Burning Questions...

PC managers say they are much more interested in Windows than OS/2.



SOURCE: INFOWORLD READER SURVEY

er did for Windows what 1-2-3 did for the PC." Morse said he became an instant convert — which meant he also had to become an evangelist to implement a Windows strategy in his organization.

For many, the turning point in favor of Windows was the introduction of Excel, Microsoft's spreadsheet for Windows. It was then, said Cornfield and others, that users started to sit up and take notice.

"At that point, there was a lot of coverage by the press, and things really took off," Cornfield said.

But despite a lot of continuing vocal concern on the part of other PC software vendors, users apparently don't worry about the fact that Microsoft is increasingly being put in an all-powerful position in the industry.

"You know why Microsoft is so powerful in the industry?" asked Morse, "because it makes good products. DOS is sound, OS/2 is basically sound, Windows is excellent. Microsoft puts the emphasis on quality." Microsoft can be late with products, Morse said. "But they have a history of not compromising on quality."

A DEATH KNELL FOR PM? Currently, the prevailing wisdom is that the technical excellence of Windows 3.0 is likely to at the very least stall, and perhaps even kill, the smooth transition of corporate America to OS/2 and Presentation Manager.

The fact that Windows 3.0 has almost exactly the same look as PM has confused the issue, users said.

But many PC professionals say this is simply not the case.

"A lot of people have talked about Windows 3.0 killing Presentation Manager but, in fact, I don't see that happening at all," Cornfield said. "Yes, probably a certain percentage of users will stay with Windows — a higher percentage than if Microsoft had stopped Windows development with 2.X — but on the whole, there will be so many more users interested in a graphical user interface as a result of Windows 3.0, that it's better for OS/2 in the long run."

In absolute numbers, the fact that Windows — and the intense excitement over Windows 3.0 — has become so popular has expanded the community of users interested in a consistent, graphical interface, so that in sheer numbers alone, Presentation Manager has benefited, said Cornfield and others.

There is no doubt that interest in OS/2 has waned as Windows progressively picked up support in the last 18 months, as shown by *InfoWorld*'s poll of readers.

Of all the PC managers questioned, 50 percent said they were "very interested" in Microsoft Windows, and 37 percent "somewhat" interested. This compares to only 28 percent saying they were "very interested" in OS/2, and 50 percent "somewhat" interested in the next-generation operating system being code-developed by IBM and Microsoft. (See chart, this page.) Interestingly, only 12 percent said they were "not at all" interested in Windows, compared to 22 percent who were "not at all" interested in OS/2.

INTERIM OR PERMANENT? Other issues persist for corporations standardizing on Windows: How long will this platform remain viable? Is this simply an interim standard until OS/2 applications are available? Or is Windows going to take most corporations well into the 90s?

In the beginning, there was little doubt. Microsoft made it clear that Windows was considered an interim platform, a step on the inevitable road to OS/2 and Presentation Manager. After a reluctant pause, IBM eventually began saying the same thing.

But now, the position of both firms has apparently changed.

RICHARD JOHNSON

"There is a longer learning curve for developing Windows applications."

CAMP's Julian Horwich

Both Microsoft and — more quietly — IBM itself say that Windows will be the environment of choice for 286-based PCs and lower-end home and office users, leaving 386s and above for OS/2.

There are some ways that using Windows as an interim corporate standard work: For example, Excel macros written under Windows can be easily used in the Presentation Manager version, said Manufacturer Hanover's Morse; Word for Windows will also have the same keystrokes and functionality as Word under Presentation Manager. But there are some things that won't transfer, Morse said. The Software Developers Kit (SDK) for Windows is completely different from OS/2, therefore any internal applications development would have to be rewritten.

At American Airlines, the Interact project is definitely *not* interim, but a long-term office automation strategy for the Fortune 500 airline.

"We believe — and this has been backed up by Microsoft — that both Windows and OS/2 are long-term products, each of which will be continually evolving," Pendleton said.

He added, however, that there are other projects within American Airlines that are utilizing OS/2.

TEMPTED AWAY FROM APPLE. Indeed, the platform likely to suffer the most at the hands of Windows 3.0 is the Mac, said PC managers. This is especially true if a current trend continues: Mac developers turning an eager eye toward the lucrative opportunities in the Windows market. Already a significant number of Mac applications have been ported over to Windows, with more to follow.

"We've seen a lot of organizations that were buying Macintoshes two or three years ago, buying Windows today," Cornfield said. "A lot of people are moving from the Mac to Windows; virtually none to the other way."

The greater suitability of networking Windows machines vs. Macs is a prime reason for this, said Cornfield and others.

In addition, Apple's overly aggressive litigiousness has not endeared it to the majority of the PC-using community. Given the fact that it built on technology developed by Xerox, many feel affronted by Apple's attempt to bully Microsoft.

"Apple shot itself in the foot with that lawsuit," said one PC manager for an East Coast Fortune 500 firm, who said that the incident left a bad taste in the mouths of many PC professionals nationwide.

"Generally, it's hard to convert Mac users over to the PC world, but Windows 3.0 might actually do that in the corporate environment," said a Windows 3.0 beta tester, also an avid Mac user. "A corporation impressed with the Mac's interface could get converted to Windows on the connectivity issues alone."

Still, others say the Mac will continue its climb into corporate America.

"Windows will affect Mac sales a bit," said CAMP's Horwich. "But there is still a lot of excellent software only available on the Macintosh. It really depends on what software packages people need."

WHAT LIES AHEAD. The consensus among Windows users, developers, and analysts is clear: Windows is here to stay, and once Windows 3.0 is officially announced and shipped, support is likely to grow stronger. It is also likely that fewer Windows users will consider it an interim solution. For whatever reason, corporate America has postponed OS/2 migration — perhaps indefinitely — in favor of an environment that no one, with the possible exception of Bill Gates, ever thought would succeed. □

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PRODUCTS

Windows Apps: Finally Here!

BY PEGGY WATT
SOFTWARE NEWS EDITOR

During most of its six years of existence, Windows has been caught in the classic chicken-or-egg scenario.

Users weren't embracing the new, hardware-demanding, memory-hogging environment because they saw few hot applications to lure them away from their 8080s into a graphical world. And application developers weren't going to sink hard-fought development dollars into a new environment virtually nobody used.

That was then, this is now.

If a fountain of Windows applications is not brimming forth, it's at least a healthy stream, burgeoning every day.

"I don't know of a major applications category you won't be able to get a Windows application for, after Windows 3.0 is available," said Russ Werner, general manager of Microsoft's DOS and Windows business unit. He's got a directory of more than 600 programs to prove it.

It's hard to pinpoint just when the Windows desert of *then* turned into the oasis we see *now*. Certainly it's been in the past year or so that we've seen significant splashes in several markets: the Superbase 4 database from Precision Software, Drafix Windows CAD from Foresight Resources, Microsoft Word for Windows, Micrografx Designer, Ami Professional, and Microsoft Project for Windows to name a few. The first real waves became evident somewhere between the delays in accepting OS/2 Presentation Manager and the whispered rumors about Windows 3.0. The rumors have become a roar, and the floodgates have opened.

WORD PROCESSORS. This is still the biggest single application category in computing; workers who haven't found a use for electronic worksheets still can identify with a PC as a giant, full-featured typewriter. Microsoft Windows took a page from the Macintosh and shipped in 1985 with Windows Write and Windows Paint, but the entry-level word processor was neither intended to nor could it meet every word processing need.

Samna Corp. of Atlanta beat Microsoft out the door in this market with its $199 Ami word processor, followed last year by Ami Professional. Ami was the executive word processor to get you started, featuring multiple views, a basic WYSIWYG layout mode, text-flow around frames, file import and export functions, and a spelling checker — along with the cut/copy/paste and mouse functions integral to Windows.

Ami Professional, priced at $495, offers most of the features expected of a sophisticated word processor: custom views, tables, split screens, templates and style sheets, extensive macros, drawing capabilities, and a thesaurus — plus the Dynamic Data Exchange capabilities touted by Windows proponents and made possible by that environment. Ami Professional was this month updated to Release 1.2 to support Windows 3.0 as well as add awareness for New Wave, the Hewlett-Packard distributed computing environment built on top of Windows.

Microsoft finally shipped the longtested Word for Windows late last year. The $495 word processor outshines its character-based cousin by embracing the graphical environment with a fully WYSIWYG interface, heavy emphasis on the mouse (though with support for keyboard commands), various graphics and text import functions, chart and graph capabilities, two-way DDE support, and a growing library of templates and style sheets. Microsoft's applications group has been slow to support its systems group counterparts with Windows programs, but it has come out with solid products in Word and Excel — no also-rans here, despite Microsoft's propensity for being No. 2 in most DOS applications categories (before Windows, that is).

A lesser-known entry in this category is about to enter the fray refurbished. NBI released Legend as a high-end word processor/desktop publishing package well over a year ago, and only repositioned it more specifically last year as a word processor. The Windows desktop publishing crown was snapped up by Aldus Pagemaker, as the Seattle company's corresponding product had done earlier on the Macintosh. Version 2.0 of Legend is a complete rework and is slated for a July release; the product has already earned interest from analysts who got an early look. The revamped version, Legacy, will require Windows 3.0.

In the still-coming category: Topselling word processor Word Perfect, available now on almost every platform in the known electronic universe, is also being developed for Windows 3.0, the Orem, Utah-based company announced recently. Word Perfect for Windows will be a port of Word Perfect 5.1, and the developer says its files will be compatible with that release and its upcoming OS/2 Presentation Manager version.

"Once our customers realized the transition from DOS to OS/2 would take years rather than months, Windows became an important platform for us," said Pete Peterson, Word Perfect Corp. executive vice president. However, this version is still second priority to Word Perfect's OS/2 efforts, and is not expected to ship until mid-1991, contrary to Word Perfect's comments at last fall Comdex that it would ship the product this summer.

SPREADSHEETS. Microsoft took another tip from its Macintosh applications group in this category when it launched Excel as its first real Windows application. The $495 spreadsheet, released approximately 18 months ago, is also due for an update this summer. The current version is probably more than a little responsible for the interest in graphical spreadsheets and the availability of such graphical add-ons as Impress and Allways to character-based 1-2-3. Excel already supports DDE with Word and other Windows applications; its next version is expected to add the capability to take advantage of Windows 3.0 as well as New Wave.

Lotus still doesn't have a Windows spreadsheet on the shelves, but the company earlier this month said it is developing a Windows 3.0 release based on 1-2-3/G, its OS/2 PM product. Because Release 3.0 uses a DOS extender different from the technology provided in Windows 3.0, Lotus also announced an update, Release 3.1, that will ensure the application's compatibility with Windows 3.0.

But Mosaic Software Inc., Lotus' rival in litigation as well as in the fight for the CPU, will release Twindows this summer, which runs under Windows. And Microsoft isn't the only developer to have learned from its Macintosh experience. Informix Software Inc. of Menlo Park, California, is developing a Windows version of its Wingz spreadsheet. Industry observers expected to see it unveiled with Windows 3.0.

DATABASES. Aye, here's the rub. Whether there's something about the graphical world that makes data entry tough, or the two-year-plus spectre of a rumored Microsoft database code-named Omega that worries vendors, the category of Windows-based databases is hardly brimming over. Precision Software Inc. of Irving, Texas, has released several updates of its two versions of Superbase, originally developed to run under Digital Research Inc.'s GEM interface. Its current Superbase 4 earned Microsoft's nod of approval to be included with Excel and Word in several recent federal contract bids. The program draws on graphical features like font support, forms design, and image import, as well as Dbase file format support and calculations. But its next release of this $695 database, due out next month, will support Windows 3.0 with Dynamic Link Libraries (DLLs) to Windows graphics programs.

Also on the Dbase front is Bumblebee Software Inc. of Bellevue, Washington, which expects to ship an updated Dbfast for Windows 3.0 this summer. The $395 product, which supports all graphical Windows functions and DDE, compiles Dbase code, with extensions, into Windows-executable programs.

The $395 Opus 1 from Roykore Software of San Francisco is primarily an image database; the company also bills the product as a graphics package. Opus offers drawing tools that can link text to images and search on text conditions.

"The real value to a Windows-based database is not the database, it's the report function, being able to do reports on something besides a dot-matrix printer," said Jeffrey Tarter, industry analyst and editor of *Softletter*, in Watertown, Massachusetts. Tarter is convinced there is plenty of room for growth among Windows database products. "Proprietary data file format is the kiss of death. The Dbase file format is bad, but that's

what you've got to do," he said.

In the network database foray, Gupta Technologies of Menlo Park, California, has developed SQL Windows, an application development interface to its own SQL-Base engine. Gupta's product has the potential for workstation database enhancements.

To keep the category competitive, Ashton-Tate has quietly shown a version of Dbase running under Windows, and Borland International said at our deadline that it would show Paradox under Windows 3.0 by the time Windows shipped.

Forms development applications, related to databases, are also represented among Windows applications. The latest entries include Formworx Corp.'s Form Publisher, Information Integration with Form Master, Xerox Formbase, and others.

GRAPHICS, DRAWING, CHARTING, CAD, AND DESKTOP PUBLISHING. This is the category where Windows shines — graphics for the graphical environment. Circle and square reshaping and resizing at the scurry of a mouse. Patterns, colors, and on-screen fonts provide illustration and publishing tools previously limited to high-end systems (and the Macintosh).

Helping to prove from the start that DOS isn't drab was Micrografx Inc. of Richardson, Texas, which has focused on Windows applications with its In-A-Vision CAD program (the first third-party software package released for Windows); Micrografx Graph Plus (formerly Windows Graph); Micrografx Draw Plus; and Designer — along with files full of TIFF clip art. The $495 Designer 3.0, Micrografx's headliner product, offers CAD features for use in drafting as well as high-end illustration techniques such as spline curves, Bezier curve editing, auto-trace and, recently, enhanced text support.

Micrografx considers Designer a CAD tool, but its emphasis is free-form drawing rather than the structured technical tools available in Drafix Windows CAD from Foresight Resources Corp., in Kansas City, Missouri. The $695 Drafix Windows CAD provides basic CAD functions and split screens through menus and mouse command. It supports Windows' DDL for easier links to other Windows programs.

"There are some disadvantages to being the only one in a category," says August Grassis, Foresight's president. "A lot of companies feel the applications are somehow more stable when there's a choice. Another problem is the requirements for a competitive bid [for government contracts]; they [government agencies] either have to lower the standards or change the specs so there's more than one bid." Market leader Autodesk Inc. of Sausalito, California, has expressed some interest in the category, but has focused instead on porting its Autocad programs to OS/2.

The $395 Arts & Letters Graphics Composer and the $695 Arts & Letters Graphics Editor from Computer Support Corp., in Dallas, provide text and shape manipulation techniques ranging from shrinking or growing images to bending, flipping, and twisting graphics. Each graphics tool comes with thousands of clip-art images.

CorelDraw from Inc. of Ottawa, Ontario, last year released Corel Draw, a $595 illustration program with freehand drawing and text control features that include a library of 57 fonts, calligraphic tools, and Postscript fills, as well as auto-trace and bit-map support. The company recently announced its shipment of a Windows 3.0-compatible version.

Adobe Systems Inc. of Palo Alto, California, has developed a Windows version of its popular Macintosh program, Illustrator. Besides freehand drawing, it provides tools for automatic tracing and editing of scanned images, tools to draw lines and Bezier curves, and to rotate and scale text and images.

Not to be forgotten in this category is Lotus Development Corp., which is still lacking a Windows spreadsheet. CEO Jim Manzi has said that Lotus will have an illustration program — a la Freelance — on every platform for which it ships a spreadsheet.

Windows versions of existing graphics programs have also become a priority for several developers. Zenographics Inc. of Irvine, California, is releasing a Windows 3.0-compatible Pixie 2.0, a $295 charting package with DDE support and other enhancements. Another Adobe product, the $395 Streamline, is a port of the Macintosh product and offers the same auto-trace features for graphics editing.

Fresh off the vaporware list is Powerpoint for Windows, the counterpart of the successful Macintosh graphics product. Microsoft upgraded its Windows 3.0 version earlier this month. Windows Paint is included with Windows and has been upgraded for Windows 3.0 to include color and other features obvious by omission in previous releases.

The company that defined the term "desktop publishing" — first on the Mac — didn't waste any time getting to the DOS Windows platform. Pagemaker for Windows has been a leader since its 1986 release; developer Aldus Corp. of Seattle tries to keep the two versions in sync. Version 4.0 for the Mac, introduced earlier this year, is expected to be matched soon by a Pagemaker for Windows 4.0 product that was awaiting Windows 3.0, Aldus revealed.

Ventura Publisher is due for release in versions for Windows, Presentation Manager, and the Macintosh to join the GEM-based product now shipping. Ventura's developers are finishing the project for Xerox, and others supplied the Windows 3.0 code to be frozen to put the finishing touches on their program, said John Meyer, Ventura's president.

"This release will make even skeptics believers in Windows," Meyer said.

COMMUNICATIONS. Windows is not wanting for communications products, although the concept of easy-to-use graphical interface into an often-unfriendly terminal emulation product seems to miss the point. But not all Windows communications programs turn Windows into a 3270 look-alike; the most recent releases take real advantage of the environment's pull-down menus and pop-up dialog boxes.

Among the newest is Crosstalk for Windows, from Crosstalk Communications of Roswell, Georgia. This $195 program is not simply a port of the popular DOS package; it has similar power and protocol options but adds the mouse operations and window functions of Windows. It also has a scripting language and supports DDE.

Microphone II for Windows from Software Ventures Corp. of Berkeley, California, moved to the PC world with the same use of windows, menus, and buttons that it used in its earlier version for the Mac. The $295 program includes a scripting language compatible with its Mac counterpart, and common file transfer protocols and terminal emulation.

Hi-Q International Inc. of Daytona Beach, Florida, recently released APE (A Programmable Editor), a multiscript terminal emulation and asynchronous communications program for Windows. The $189 program supports most common emulations and protocols, as well as DDE functions.

Futuresoft Engineering Inc. of Houston offers several synchronous and asynchronous session options for Windows users with several editions of Dynacomm, which feature different terminal emulation choices for each of the $295 packages. Users can design and create screens, use DDE, and draw on the programs' E-Mail functions. Futuresoft Engineering also developed the Windows 3.0 Terminal accessory, with surprisingly full-featured communications program.

E-Mail is the primary function of two other communications programs for Windows: Da Vinci E-Mail for Windows, a $1,145 Windows electronic mail system for LANs; and CC Mail for Windows from CC Mail of Mountain View, California.

Related programs include those that add fax support to the Windows environment. Alien Computing of Palmdale, California, markets the $179 Faxit for Windows, which provides a "fax" window similar to the environment's "print" window, to support most Windows applications files.

LOTS OF OPPORTUNITIES. Windows products are starting to surface in several other product. A few weeks before Windows 3.0 was scheduled to be announced, Microsoft showed off Microsoft Project for Windows. Another category is utilities; these improve upon the Windows interface and abounded with previous Windows releases. They will continue to appear. (See "Filling the Gaps: Innovations and Enhancements," Page 518.)

Windows, as a new environment, paves the way for truly innovative, new applications. Many a jaundiced power user or industry watcher cringes at the cry, "It's an entirely new category of application," but it's products such as Windows that help make that claim occasionally be genuine.

One example is Thinx, a $495 writing tool that encompasses charting and drawing functions, too. The program, due to ship next month from Bell Atlantic Corp.'s new microcomputer software division, is described as an "image-data link" by product manager Jack Coppley.

"This is something you couldn't do in bare DOS," Coppley said, describing the program as "a tool for people who want to attach ideas or numbers or other data to images." For example, you can build a map with each state or country represented by a button that pops up data when pushed. You can change drawing attributes by changing the data on which they are based, from instructions as simple as changing colors to as analytical as a query that changes the pattern of all states with sales between user-defined amounts. It supports DDE, so users can interactively update data across files or applications.

Other innovative products may be surfacing, but they'll be hard to spot.

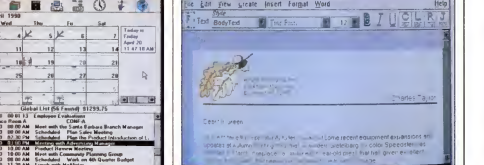
"The trouble is, as good as Windows 3.0 is, it's still following a well-beaten trail of the Mac," said *Softletter*'s Tarter. "I think the only places we're going to see interesting applications is where [where] there aren't overlaps with the Mac."

Tarter is looking for a scripting language, more sophisticated than Hypercard, but "a kind of external macro language that will let you move data across applications and turn everything on and off," he said. "If you're moving across different file formats, you need an external scripting language that lets you create an integrated application that would automate the assembly of a document."

The lack of "if then" branches in Windows 3.0's built-in macro recorder prevents it from serving that need, Tarter said.

Other new technology that may appear first under Windows is a new compound document technology being developed by Microsoft. Under the embedded-document technology, which builds on both DDE and the Windows Clipboard, material created under one application and imported to another (a compound document) retains attributes of the original product for further editing.

"For example, in Windows Word today, you can import a graphic or a chart and it's part of Windows Word," said Mike Maples, vice president of Microsoft's applications division. "You can only do it in what Windows Word can do. But this embedding architecture initiates the program that created that chart, so you can edit with that application's tools. It's conceptually beyond the cut and paste of the Clipboard." Powerpoint, Micro-



Polaris' Packrat is a PIM with interactive calendars, contact logs, and expense tracking. A network version is also available.

NBI's Legacy office/professional word processor offers multiple text streams and other desktop publishing capabilities.

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soft's popular Mac presentation graphics program, will probably be the first to support such technology, Maples said.

Building on top of Windows is HP's New Wave, an object-oriented environment that provides embedded document technology. Users can embed applications into other New Wave applications. New Wave is also being developed to run across platforms as New Wave Office. New Wave-aware applications can take advantage of the environment's "agents," which are "super-macros" that automate tasks and link applications.

"New Wave is a tool set of extra capabilities on top of the existing Windows platform," said Mike Webb, New Wave developer manager for HP, which expects to release New Wave 3.0 — synchronized with Windows 3.0 — within a few months of the Windows release.

Another caveat about show-stopping new concepts: you might not recognize them at first.

"The really interesting apps never look like natural winners when you first see them," Tarter said. "Who would've thought a page-description language was going to be a big hit?" But Postscript and other innovations "break the rules," he said. "The really new stuff catches people by surprise, opens new markets, and is incredibly hard to predict. They come from unknown companies that don't have an installed base to protect."

A further change with Windows 3.0 is that Microsoft has stopped offering a run-time version of the environment to applications vendors, who had been offered free licenses of run-time versions of Windows 1.03 and 2.11. However, vendors with licenses may continue to ship run times with their applications, Microsoft's Werner said.

The time has come to multitask, which is not possible with a run time, Werner said. "Run times only allow you to run one Windows application at a time," he said. "It really was designed as a short-term event."

It is Windows 3.0 that makes multitasking a reality, agreed consultant Jerry Schneider. "Up 'til now, Windows has not been a suitable platform for running multiple applications," Schneider said. "Windows 3.0 will simply provide the best platform for Windows applications. And a slew of applications developers are ready. It's almost what Lotus was for the PC as far as legitimization of its business use."

Personal information managers (PIMs) have already proved a popular Windows category. IBM entered the fray with the $395 Current, developed by Jensen-Jones Corp. but published by IBM's Milford, Connecticut, desktop software division.

"Here we are, six years after Windows was announced, and the industry is really starting to take it seriously," said John Merson, acquisitions director of IBM's desktop software division. He sees opportunities in the new environment, especially for new developers — or downsized divisions of existing companies. "It's the guerrilla tacticians who go out and compete."

"There are things you can do in Windows that you can't do in Presentation Manager," said Jack Leach, president of Polaris Software of Escondido, California, which expects to release an update of its Packrat PIM for Windows 3.0. The new $395 Packrat 3.0 provides a new project management segment supporting graphic calendars and Gantt charts as well as a time management facility that includes time and billing features and financial management tools.

SHAREWARE. A new environment also draws shareware, the counterculture of the software industry. Command Post, a Windows extension program from Wilson Window-Ware, in Seattle, provides user tools to redefine the Windows screen, set up child windows that list applications, and use other shell features. It is available on a try-before-you-buy shareware basis for $50. Two high-profile shareware companies, Buttonware (marketer of PC-File) and Quicksoft (which develops PC-Write), have said they will release Windows versions of their flagship products.

Tracking down Windows products *is* getting easier. More Windows programs are on retail shelves, and some dealers provide separate Windows sections. For mail-order buyers, Windows shopping is also getting simpler. Command Post's developer also runs a mail-order catalog of Windows and Presentation Manager applications called *Window-Ware Warehouse*. Tiger Software, of Coral Gables, Florida, a mail-order house, is launching a catalog of strictly Windows programs. Also newly published is *The Windows Shopper's Guide*, a thick magazine of Windows applications, including reviews, from White Fox Communications, in Beaverton, Oregon.

"1990 is the Year of Windows," declared Basil Maloney, executive director of the industry organization Windows & Presentation Manager Association (WPMA), based in Richardson, Texas.

To help users get acquainted with Windows 3.0 and its wide world of applications, Microsoft is going on a 10-day "Road Show '90" in June and July. It starts June 4 in Atlanta for the first of a series of two-day conferences, with introductions to Windows; hands-on training with a variety of Windows applications from Microsoft and other vendors; and tips on using Windows and integrating Windows systems into existing office environments. The show will pass through San Francisco, Los Angeles, Detroit, Minneapolis/St. Paul, Washington D.C., Boston, Chicago, Dallas, and New York City. Registration and more information are available by calling Microsoft at (800) 942-1048.

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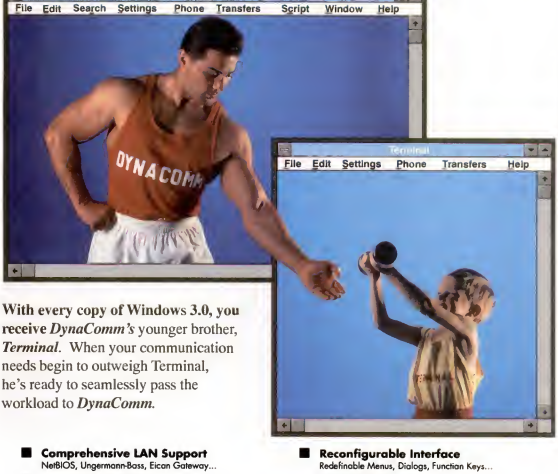

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WINDOWS DEVELOPMENT

Application Tools Are Proliferating

BY STUART J. JOHNSTON
INFOWORLD SEATTLE BUREAU CHIEF

Windows 3.0 finally realizes a vision that has been a long time coming — in fact, ever since Microsoft's announcement of the first version of its interface in late 1983.

Of course, the Windows objective of running and using multiple applications was a tremendous development challenge for both Microsoft and independent software developers. Indeed, much of Windows' preeminence results from thousands of incremental steps as new versions of the environment and new applications and updates were released.

Much of that evolution would have been further delayed — or put off indefinitely — if it were not driven by the human tendency to create new tools to deal with new challenges.

"There's a nice aftermarket developing," said Carole Patton, publisher of *Acknowledge The Window Letter*, a leading Windows newsletter. With about 450 separate function calls, developing products for Windows is "so esoteric that people call me up to complain about all the strange [error] messages they get," she said.

A huge number and variety of tools exist today that simplify application development, with more appearing almost daily. Additionally, virtually all of the companies we interviewed said they have new releases of their tools to support Windows 3.0 ready now, or close to shipping. One of the reasons for updating those products is to ensure they conform to Windows 3.0's memory management scheme, which adds the capability for programs to run in protected memory and take advantage of more than 640K of RAM if it is available.

Since this article had to be completed before the Windows 3.0 release date, however, many companies were understandably reluctant to discuss specifics of their products (as that could violate nondisclosure agreements or jeopardize marketing plans, or both). Therefore, you should note that some prices as well as features listed for some products may have changed.

While Windows development tools abound and not all are mentioned here, this discussion is designed to give you a basic idea of what kinds of development tools are available today and what's coming soon.

TECHNICAL TOOLS. Developers' tools can be broken into several subclasses, including traditional languages that support Windows, object-oriented programming (OOP) languages and tools, code libraries, computer-aided software engineering (CASE) tools, and database development tools.

Of course, primary on the list is Microsoft's Windows $495 Software Developer's Kit (SDK) which provides the basic components needed to develop programs that run on the PC. The SDK contains such other essential development tools as font, icon, and resource editors; sample code; and working C-language code for creating basic window components such as scroll bars and dialog boxes.

Although some third-party developers' tools provide utilities or other capabilities that obviate the need for the SDK, a majority of Windows programmers use it. For many developers, the most common tool they use besides the SDK is a C compiler, the language in which the bulk of Windows itself is written.

Many programmers choose Microsoft's professional C compiler ($495), partly because they feel a language from Windows' developer is more likely to be compatible and spawn fewer surprises than other vendors' languages. However, other languages can now be used for Windows development as well, although this frequently requires special assembly language routines to accomplish linkage between code written in different languages.

"It used to be that your choices were [mostly] limited to C and the SDK," said John Fitzpatrick, Microsoft's manager of Windows developer relations. Users of Microsoft's Professional Basic, for example, can obtain routines from the company that let them create Windows programs.

The extended edition of Topspeed C ($395), from Jensen & Partners International of Mountain View, California, also supports Windows. Additionally, the Topspeed extended editions ($395) of both Pascal and Modula-2 provide Windows programming capabilities, according to Jensen & Partners.

Chicago-based Realia Inc. is also hoping to ship by the year's end a library of Windows routines for its Cobol compiler, said Ken Belcher, Realia's president.

Perhaps even better suited to the development of applications that run under a graphical user interface (GUI) like Windows, though, are OOP languages and tools.

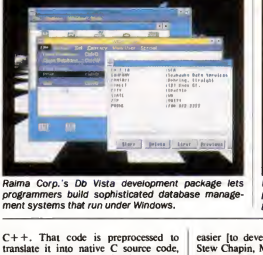
OOP LANGUAGES. The heir apparent for OOP programming is C++, the OOP language developed by AT&T (which also created C). Microsoft has long been working on its own version of C++, but in the meantime Windows programmers are being directed to a version of the language from the Ireland-based Glockenspiel company.

Glockenspiel's C++ preprocessor ($499), which was recently updated to support Version 2.0 of the AT&T C++ OOP language specification, as well as its Commonview ($599) package (which includes C++, an "application framework," and object libraries) both support Windows.

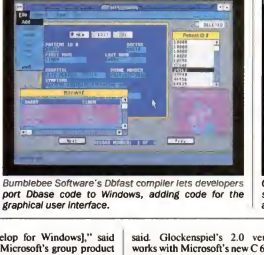
C++ is a hybrid of C that lets developers define code "objects" that encapsulate all of the data and functions required for complete programming functionality. Since C++ contains language constructs that are not native to C, however, it is ordinarily implemented as a preprocessor, or translator.

Developers write source code in

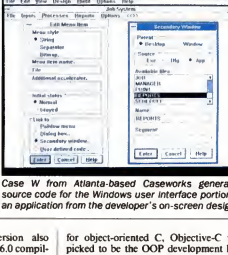
Flow chart shows the steps required to port an existing Dbase application to run under Windows using the Dbfast compiler.



Raima Corp.'s Db Vista development package lets programmers build sophisticated database management systems that run under Windows.



Bumblebee Software's Dbfast compiler lets developers port Dbase code to Windows, adding code for the graphical user interface.



Case W from Atlanta-based Caseworks generates source code for the Windows user interface portion of an application from the developer's on-screen design.

C++. That code is preprocessed to translate it into native C source code, which then must be compiled into executable machine code by a C compiler.

One of the disadvantages of this approach is that it is often difficult to locate bugs in the original C++ code. Glockenspiel last month shipped a 2.0-compliant version of its preprocessor that supports more complete source debugging using information provided by Microsoft's new C 6.0 Programmer's Workbench. Microsoft, for its part, has been mum about when it might release its own C++ 2.0 native-code compiler which will support source-level debugging.

A major advantage of OOP languages is that GUI components — i.e., a complete functioning Windows interface — can be implemented as a hierarchy of reusable software objects called a "class library."

Proponents note that the way humans deal with reality is not as nebulous concepts but as "things" or objects. Creating code objects that parallel components of the interface — i.e., windows, dialog boxes, scroll bars, etc. — ultimately makes programming the interface more intuitive and, therefore, easier, they argue.

"Class libraries that cover GUIs are clearly the kind of things that make it easier [to develop for Windows]," said Stew Chapin, Microsoft's group product manager for languages.

Many developers — Microsoft included — believe that while there are other OOP languages that can be used, C++ is likely to be most popular.

But learning C++ is daunting, and some developers say the tools are not yet ready for prime time. "At one point last year, we tried to move over to C++ but the Glockenspiel [product] wasn't really ready yet, so we moved back [to Microsoft C]," said Brian Conte, president of Redmond, Washington-based HDC Computer Corp., developer of the Windows Express and Windows Manager utilities.

"We'd like to move to C++ but don't know how long we'll have to wait for the Microsoft version," Conte said, adding the company uses the SDK, C, and a library of internally developed routines.

"C users sometimes expect C++ to be much like C and find it daunting that there's a fairly steep learning curve," said Joshua Caldwell Allen, vice president of marketing and sales of Imagesoft Inc., the Port Washington, New York-based company that distributes Glockenspiel's products in the United States.

Still, there is "a lot of demand" for C++ among Windows developers, Allen said. Glockenspiel's 2.0 version also works with Microsoft's new C 6.0 compiler, taking advantage of an important feature of its integrated Programmer's Workbench and Codeview 3.0 debugger — a "project database" of code information — that lets developers debug code at the C++ source level.

Despite Microsoft's vocal support of the Glockenspiel preprocessor, the current market leader in the C++ arena is from Zortech of Arlington, Massachusetts, which boasts 40,000 compilers in use worldwide, said Paul Leathers, the company's president. Released last fall, Zortech's C++, Version 2.0 is a native-code compiler that fully supports Windows and has source-level debugging, Leathers said. The developer's edition of the compiler ($450) comes with four basic class libraries and another 20 are available, he added.

Another offshoot of C, Objective-C from Stepstone Corp., in Sandy Hook, Connecticut, will support Windows development this summer when the company will begin comarketing a version of CNS' C-talk/Views ($450). This OOP development system includes a class library of Windows objects and is currently being rewritten for Objective-C, said Sarah Bell, a Stepstone marketing representative. While not likely to become the standard for object-oriented C, Objective-C was picked to be the OOP development language shipped with the Next computer, which features the Next Step graphical interface.

One of earliest OOP tools for Windows was Evanston, Illinois-based The Whitewater Group's Actor ($695), an interactive object-oriented programming language and development environment optimized for developing Windows applications.

"Whenever the next release of Windows comes out, we will have a new release of our products that fully supports it," said Mark Achler, The Whitewater Group's president, before last week's announcement.

The company also offers Actor Language Extensions ($99) and other Windows development tools. These include Wintrieve ($395), which provides an Indexed Sequential Access Management (ISAM) engine with access from C or Actor; and the Whitewater Resource Toolkit ($195), a set of editors for customizing Windows interfaces.

The Whitewater Group will also release Object Graphics, a class library of two-dimensional graphics objects, Achler said.

LIBRARIES. There are other OOP tools for Windows besides C++, Objective-C, and Actor. Some of these fit into both OOP systems and CASE tools categories (discussed below). Other tools, however, include libraries of code objects that can be reused and modified to meet specific needs.

Libraries provide functions that developers require but that are not in the basic calls available in a chosen language. Instead of writing and testing their own functions, developers purchase these libraries of prebuilt functions.

In addition to libraries mentioned above, there are a variety of both objects-oriented and non-object-oriented libraries available for Windows programming. For example, Eikon Systems Inc., in Foster City, California, will be shipping updates to its class libraries for Windows almost immediately, said Kevin Welch, company president.

"Our philosophy is to create high-quality, reusable software objects that programmers can use in creating their own applications," Welch said. "It would take you several man-months to create your own [and] hopefully, later on, there will be more tools that can integrate these objects," he added.

However, instead of selling collections of objects as it previously has in its Standard and Tools Control Paks, Eikon will sell object libraries for individual controls. For example, developers will be able to buy a Ruler Control Pak that provides a library of objects for adding rulers to

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desktop publishing and word processing applications, Welch said.

In addition to ruler objects, Eikon will offer individual Arrow, Picture, Palette, Toolbox, and Slider Control Paks. They will range in cost from $125 for a control object as a Dynamic Link Library (DLL), to "about $625 for the most sophisticated control with complete source code," Welch said.

Both Windows and OS/2 use DLLs to save space by providing libraries of commonly used routines that any program can call, rather than incorporating those routines separately into each program, said Phil Barrett, Microsoft's development manager for Windows and DOS.

"It's also a good structuring technique," Barrett said. "For example, you can have a separate DLL that supports each type of graphic and add new tools or enhancements without shipping a whole new product."

Eikon also offers the Resource Scrapbook ($225), a tool that allows programmers to catalog and organize Windows resources.

The available non-object-oriented libraries are designed to meet a variety of needs, such as database construction and querying, and network communications. Coromandel Industries Inc. of Forest Hills, New York, sells C-trieve/Windows ($395), an ISAM file manager library based on the X/Open standard for use in building data management applications. Both C-trieve/Windows and Integra/SQL ($695) — an SQL-based relational database engine due to be updated soon — work with Windows' Dynamic Data Exchange (DDE) and support SQL statements embedded in C and C++ code, a spokesman said.

Microsoft included DDE in Windows and OS/2 in order to provide a protocol that lets programs running on the same PC exchange information on a dynamic basis.

Code to enable DDE functions, which have been available in earlier versions of Windows, is not particularly difficult to add to an application, Barrett said.

"The most important thing [is] now that there is the availability of more memory, you can have multiple applications talking back and forth and exchanging data," Barrett said.

For developers who want to let existing DOS programs exchange data with Windows applications, Netlogic of New York City offers DOS DDEX ($2,995 for commercial licenses or $1,795 for in-house use).

JUST IN CASE. By this point, you may be thinking that there must be an easier way to write Windows applications. Indeed, programming any GUI applications environment — Windows included — is no picnic. It can take months just to get up to speed and years to produce a marketable application, if Microsoft's own endeavors are any benchmark: Four years after Windows first shipped, the company that created it finally released its second Windows application — Word for Windows.

However, today CASE tools can considerably speed the development process, and that category is where products have begun to appear en masse.

Most of these tools currently concentrate on automating the production of code required for the user interface portion of a Windows application. Since as much as 90 percent of the code for a Windows application may be required to generate the interface, this can be an enormous time-saver.

> *"Programming any GUI applications environment — Windows included — is no picnic."*

"People have a lot more choices now than they did in the past," Microsoft's Fitzpatrick said. "You can do a lot of great work without being a low-level programmer [and] you can choose the tool that's right for each job," he added.

One of the most popular CASE tools is Case W ($795) from Atlanta-based Caseworks Inc. It provides a prototyping and development environment that generates C source code from the developer's on-screen design for an application's user interface. The developer then compiles and links the GUI code with the application-specific code.

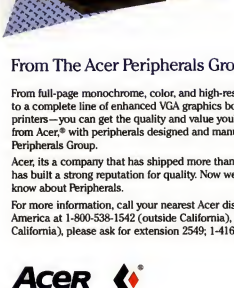
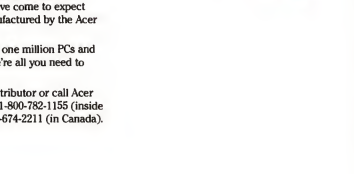
"There will be an update, probably around the end of June," said Emory Ketchersid, Caseworks' vice president of corporate development. The update — to be called Version 3.0 to coincide with Windows 3.0 — adds code generation for child windows and three levels of comments in source code.

Version 3.0, which may rise in price later to $995, will also feature an interpretive mode that lets developers test interface features before generating code, Ketchersid said.

The Protoview Screen Management Facility ($595), from Protoview Development Corp. of New York City, takes a similar approach. Protoview comprises a pair of DLLs for Windows and a screen painter with a code generator built in. With the screen painter, the developer constructs data entry screens that support editing and field validation — then generates C source code.

The company is also working on another CASE tool, called Appligen ($495), which "takes you through the complete

Preferred Peripherals

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application development process," said Dean Guida, president of Protoview.

Yet another tool in this category is Windows Maker from Las Vegas-based Candlelight Software. Windows Maker is a menu-driven package that lets developers choose Windows interface components by pointing and clicking on them with the mouse. Like the other tools, it then generates C source code.

"Our idea is to automate the SDK and let developers focus on the programs rather than on programming," said Les Lazareck, Candlelight's president. The package also includes a code profiler and a debugger, and allows programmers to install their own editors.

An update of Windows Maker ($795) that supports Windows 3.0 will "automate more of the advanced functions of the Windows SDK," Lazareck said. The update — which will also add support for child windows and additional control of dialogs, push buttons, control knobs, and shading — will be released "when Microsoft announces the commercial release of the Windows 3.0 SDK," he said.

A somewhat different approach is taken by Winpro from Ridgewood, New Jersey-based Xian Corp. Once the developer has built a "resource file" — a file required by the Windows SDK that describes an application's menus, dialog boxes, etc. — it generates commented C source code for the program skeleton, said Louis Cutrona, president of Xian.

"It turns out that the resource file is a pretty good description of what the program looks like [and] it's a good place to start to build a program skeleton," Cutrona said.

Winpro/3 ($395) is scheduled for an early June release, Cutrona said. The new version will feature an improved user interface over its predecessor, Winpro/2, letting developers interactively define many GUI components.

For code maintenance, Case W, Protoview, Windows Maker, and Winpro/3 all claim to support correct code regeneration after developers have customized or put their own code into an already-generated application.

Additionally, all four require a Microsoft C compiler, Version 5.0 or later, and the Windows 3.0 SDK.

TOOLS FOR POWER USERS. There is also a group of CASE-like tools that can be used by either developers or power users, providing varying degrees of crossover between the two categories. One of these products — Asymetrix Toolbook — has attracted a lot of attention, partly because the product was blanketed in secrecy for several years until its rollout last week in New York City, and partly because of the company's founder, Paul Allen. Allen, himself something of an enigma, was cofounder of Microsoft and is still the software giant's No. 2 stockholder.

Toolbook ($395) provides an object-oriented environment with pre-built objects and sample programs that developers can use as a software construction set to build Apple Hypercard-like applications. The application compiles down into a pseudo-code or scripting language that can be edited and executed on a runtime interpreter.

Toolbook supports communication with other programs using Windows' DDE capabilities, and also provides multimedia support.

One of Toolbook's chief competitors is Plus for Windows ($495) from Spinnaker Software Inc. of Cambridge, Massachusetts. Scheduled to ship this summer, Plus for Windows also lets users link predefined objects that provide functions such as text or graphics editing, and database fields to create a Hypercard-like application, said Kathleen Gill, director of product marketing for Plus. It also supports multimedia.

In fact, one advantage that Plus has over Toolbook, Gill said, is that Spinnaker offers an Apple Macintosh version that can read and convert Hypercard stacks. Those stacks then become compatible with the Windows version.

An add-on product, Plus Software Slots, to be shipped three to four months after the initial release of Plus, will let users create their own objects. These objects, which can be written in another language, can include spreadsheets, communications links, and high-end graphics applications, Gill said.

Owl International's Guide 3.0 hypermedia authoring system ($495) is already compatible with Windows 3.0, according to Jim Culbertson, vice president of the company's creative solutions group. Additionally, Bellevue, Washington-based Owl will roll out a new version of its Guide Reader ($60) run-time package for the PC by the end of July.

The authoring system lets developers create hyper-linked multimedia applications that include text, graphics, audio, animation, and still and full-motion video images. Version 3.0, which rolled out in February, includes an application programming interface (API) that is callable by other programs so that it can be integrated with other applications.

Echelon Development Corp. of Burlington, Massachusetts, will ship its Windowcraft ($249) tool in July, said Peter Chapman, vice president of research and development. Previously named Descartes, Windowcraft compiles stacks from Apple Hypercard, provides a superset of the Hypertalk language, and supports multiple windows, LANs, and multimedia, he said.

Proponents of all three tools tout the capability to support front-end applications such as databases or spreadsheets, and multimedia. Both of Asymetrix's competitors also claim the advantage of cross-platform support between Macs and PCs.

Most of these companies have plans to release OS/2 versions of their products. □

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CASE TOOLS

CASE for Connectivity: Vendors Ready Windows 3.0 Products

One unique genre of CASE tools is designed to let developers build graphical interfaces for connecting PC users to mainframe applications. Most of these products can be used to build cooperative processing applications that work across multiple platforms, including IBM's OS/2 Extended Edition.

Several companies that already have DOS and OS/2 products have announced they will release versions of these types of products for Windows 3.0.

Woburn, Massachusetts-based Interactive Images Inc. announced in April that it will release a Windows 3.0 version of its Easel GUI development environment this year. The package provides an interface design tool called Layout/CUA for creating GUIs that conform to IBM's Common User Access specification.

While the package has many features similar to other CASE tools described in this article, it also has some unique characteristics. These include support for a wide variety of terminal emulations as well as support for communications with mainframes and minicomputers.

Pricing for the Windows version of Easel will be "analogous to the OS/2 Presentation Manager product," said Steve Sayre, vice president of marketing, which means $7,500 for the development system and $350 per run-time system.

Several of Easel's competitors have also entered the Windows sweepstakes. Mozart Systems Corp. of Burlingame, California, has announced it will have a Windows version of its Mozart application development system. Besides having many of the same features as Easel, Mozart can read and write Dbase-compatible files. Version 2.0, which will ship this quarter, also features embedded SQL support for Oracle and Informix relational databases. Mozart for Windows will be priced comparably to the DOS version, which costs $5,000 for the development system and $500 for the run-time system.

Another competitor, Guidance Technologies of Pittsburgh, is working on a Windows version of its Choreographer product for release early this summer, said Jeffrey Bonar, company chairman and chief technical officer. Choreographer is different from other products discussed here in that the development environment runs on OS/2, while the run-time systems execute the code on various platforms. The Choreographer development environment costs $7,500 and the run-time systems cost $295 each.

Viewpoint I/F Builder, a Windows-based CASE tool for IBM connectivity from San Mateo, California-based Viewpoint Systems, shipped in January. Version 2.0, which will support Windows 3.0, will be released within a month or two of last week's Windows announcement, said Jim Murray, manager of support services. The development environment, I/F Builder, costs $17,500, while the run-time I/F Managers costs $395 each.

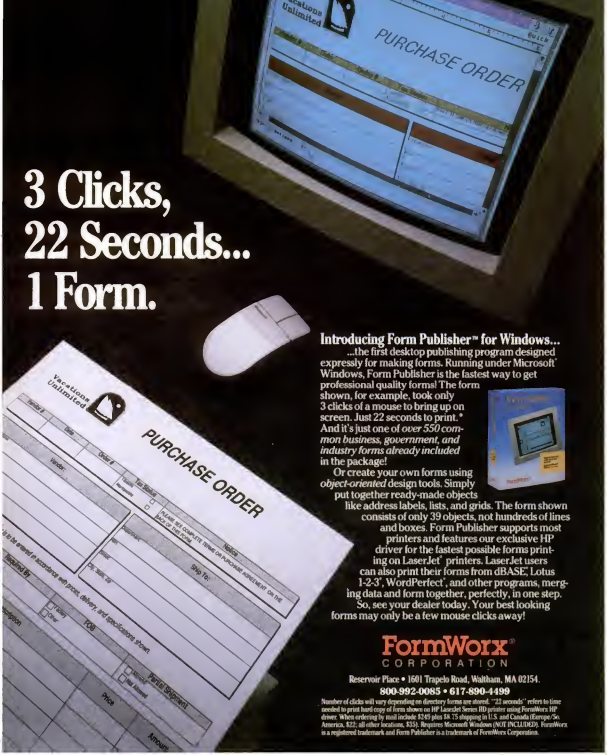
DATABASE TOOLS. While access to mainframe databases will become increasingly important in the future, building a PC-based database management system (DBMS) is a concern for many developers today.

Bellevue, Washington-based Raima Corp. has developed a version of its Db Vista DBMS development system (which starts at $695 for the database engine) that supports Windows 3.0's memory scheme. "We tend to be 10 to 15 times faster than standard relational DBMSes [and] because of Windows 3.0's memory management system, [the new version] will be even faster," said Christopher Mureen, Raima's vice president of sales.

For developers who would like to convert existing Dbase applications to run under Windows 3.0, another Bellevue-based Company, Bumblebee Software, will ship a new version of its Dbfast/Windows compiler this summer, said Bill McEwen, U.S. sales and marketing manager.

Version 2.0 of Dbfast/Windows will feature screen, reports, and applications generators, and will also be 98 percent Clipper-compatible, McEwen said. "About the only thing you have to do is add 'Create Window' [commands]," McEwen said. Dbfast/Windows costs $395.

THAT'S NOT ALL, FOLKS. There isn't enough room here to discuss all the tools that are currently, or soon will be, available for Windows. There are plenty more where these came from — thanks to the efforts of innovative tools developers who have risen to meet the challenge of easing the workload of the programmers creating tomorrow's Windows applications. □



WINDOWS FONTS

More Choices, More Confusion

BY GALEN GRUMAN REVIEW BOARD

Font technology inhabits a netherworld in computer technology. Everyone sees the results in documents, especially since virtually all word processors, desktop publishing programs, and graphics programs support myriad typefaces.

Because of the popularity of fonts, a typewritten letter or memo now looks unprofessional. Resident printer fonts, downloadable soft fonts, and font cartridges have taken the printing public by storm. Fonts are no longer a province of typographers and graphic artists highly trained in arcane ways. Today, anyone can use — or abuse — the technology. Yet the technology that makes fonts accessible remains largely hidden from users. At the same time, a stream of news continues regarding the emergence of new font technology and "font wars" between Microsoft, Adobe, IBM, and others.

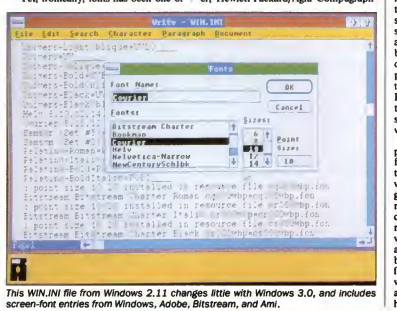
Since Windows is a graphical environment, fonts have been a focal point for many Windows applications. They all tout WYSIWYG capabilities, many offer their own fonts in addition to Windows system fonts, and third parties such as Hewlett-Packard and Bitstream have offered their own proprietary downloadable soft font lines.

Yet, ironically, fonts has been one of Windows' most criticized features, thanks to an enigmatic implementation and lack of integration of native vs. third-party soft fonts and printer font cartridges.

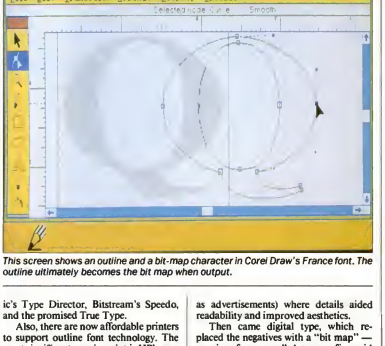
Screen and printer fonts are forever tied together but often work and appear differently. Working with them rarely produces reliable or consistent results. While some capabilities match that of the Macintosh, the Mac's integration of font technology is infinitely more seamless than that of Windows.

Let's look at some of these problems, some of your options, and how Windows 3.0 now deals with the issue.

WHY YOU SHOULD CARE. Until Microsoft and Apple announced the intention to develop a common font rendering technology (first called Royal, now True Type), the basic font technology on a PC was stable: You used bit-mapped fonts for limited printers such as Laserjets and dot-matrix printers, and outline fonts for high-quality Postscript laser printers and typesetters. This is now changing. Primarily, there is an industrywide move to outline fonts that let you render any font size on the fly for both the screen and printer (no matter what kind) and manipulate type as if it were graphics. All the major players have or are developing such type managers that support Microsoft Windows, including Adobe Type Manager, Hewlett-Packard/Agfa Compugraphic's Type Director, Bitstream's Speedo, and the promised True Type.



This WIN.INI file from Windows 2.11 changes little with Windows 3.0, and includes screen-font entries from Windows, Adobe, Bitstream, and Ami.



This screen shows an outline and a bit-map character in Corel Draw's France font. The outline ultimately becomes the bit map when output.

Also, there are now affordable printers to support outline font technology. The most significant case in point is HP's new Laserjet III, which very effectively brings this technology to the largest market segment in the PC world. And Adobe's decision to make the hinting technology in its fonts available to the public (surrendering to the pressure of the Apple/Microsoft True Type effort) means that Postscript-capable printers should finally decline in price.

With these technologies accessible for general use, you can expect to see all sorts of applications — from word processors to spreadsheets to desktop publishers — take advantage of their benefits, much as the introduction of color and graphics monitors changed the monochrome, text-based nature of software.

HOW FONTS WORK. The evolution of font technology has altered the meaning of the word "font" itself.

Originally, a font was a set of characters in a certain typeface (such as Times Roman) in a certain size (such as nine points). These characters were carved onto metal blocks, much as typewriter keys are, and arranged by hand on a press to spell out the text. The characters varied slightly in design among sizes so that each size was optimized for the best appearance. (For example, a large letter would be more detailed than a small one, since details in small sizes would get lost during printing and perhaps obscure the character's readability because of smudging.) Pieces of lead (hence the word "leading" to describe line spacing) were used to space out lines. Even until the 1960s, this was the most common technology.

Then came "cold" type, which used photographic negatives of a font and flashed light through each character on the negative in succession on film paper, which was then processed like a photograph. By varying the distance of the negative to the paper, you could get different point sizes. You no longer needed a separate font for each size, so the word "font" began to mean a typeface in all available sizes. But the difference between sizes began to disappear. Most fonts were available in two versions: text, which tended to be simple for readability at small sizes, and display, meant for headlines and other large-size uses (such as advertisements) where details aided readability and improved aesthetics.

Then came digital type, which replaced the negatives with a "bit map" — a series of very small dots on a fine grid that the human eye could not discern as separate drops, and therefore looked like continuous characters. TV screens, computer monitors, some laser printers, and all dot-matrix printers use bit maps, although they are much coarser and differently shaped than those common to typesetting machines. Typically, a digital typesetter uses 1,200 dots per inch (dpi). Because these typesetters are software-driven, type foundries (companies that design typefaces) could make the typesetter use different variations of each typeface's bit map to accomplish the fine variations in appearance that type foundries had done in the days of metal type. Rather than store each bit map (which takes lots of space), the typefaces were stored as algorithms — mathematical descriptions of the curves and lines that would draw a specific character. The typesetter had an interpreter that translated the drawing instructions, called outlines, to the bit map it would output. Printing technology is digital, even when font technology is analog.

Digital type on a desktop came most recently. Adobe Systems created the Postscript language that made digital type a reality, first on the Apple Macintosh and then on any PC. (Like digital typesetters, the outline is translated into a bit map by the printer during printing.) Adobe used the same concept as digital typesetters and a hinting technology in its outlines that optimized the fonts not only for size but for the printer. Thus, the letter "Q" in the Palatino typeface could be produced with slightly different detail on a 300-dpi laser printer than on a 1,200-dpi typesetter, even though only one outline described the letter. Since Adobe encrypted its outlines and kept the technology proprietary, other type foundries, notably Bitstream, could not have their fonts optimized based on the printer.

Instead of using outlines, Hewlett-Packard and other printer vendors used cartridges that stored fonts in certain sizes — similar to the way in which metal type was limited to certain sizes. This fenced in users' choices and split the PC world into two camps: those using modern outline technology that rivaled dedicated digital

typesetters, and those using outdated technology similar to the metal-type machines. With the introduction of the Laserjet III in March, the majority camp using the old technology now has a superb path to outline technology. It includes scalable fonts *without* Postscript and adds a proprietary Resolution Enhancement Technology that significantly smooths characters, fully exploiting their 300-dpi limit.

Although most fonts are described as outlines, screen fonts remain bit maps. Thus, you must install two fonts: one for the screen and one for the printer. Fortunately, most font vendors have installation programs to simplify this task, and you receive either a set of pre-determined screen font sizes (for example, as provided by Windows and Adobe) or you can create your own set of font sizes (for example, Bitstream).

But the fact that there are two types of fonts for the same character makes true WYSIWYG fonts a rarity. This means that what you see on the screen is *not* what you get, since the application uses the nearest size available and either overspaces or crams the characters on-screen to compensate, or substitutes a default font that it can scale to the correct size (even though the character won't look on-screen like the selected font's character to be printed). You might find yourself buying printer fonts — commonly as much as $200 a set — just to get screen fonts, since your printer or service bureau may have several built-in fonts that don't come with Windows or other applications (e.g., Palatino and Avant Garde). You can download screen fonts for free from several bulletin boards. Bitstream's Fontware Installation Kit lets you install screen fonts, and Adobe sells a special screen-font-only installer.

FONTS IN WINDOWS. The interface for loading fonts in Windows 3.0 has not changed substantially from previous versions, although a few niceties have been added. For example, you can now easily access listings of all loaded fonts and their sizes through the Fonts window, and sample screen fonts are shown for each. In general, however, the way in which you handle fonts with Windows has not changed substantially.

Windows enforces some standards on fonts, but it leaves much of the work up to the individual applications. This adds both flexibility and confusion.

The infamous WIN.INI configuration file in Windows contains lists of screen and printer fonts and their locations. The [fonts] section handles screen fonts, and the WIN.INI "softfonts=lines" in each printer/port section handles the printer fonts. The fact that each printer/port combination can have a different list of fonts (one that can also differ from the screen font list) gives great flexibility in configuring applications' font usage.

For example, you may want to use Bitstream printer fonts for proofing on a laser printer but Adobe fonts for the final output to be sent to a service bureau. Or system administrators may want to restrict a user's choice of fonts to enforce design consistency by having different font sets available via different printers or ports.

Of course, doing either requires a deep understanding of the intricacies of WIN.INI, the printers' resident fonts, and the applications that use the fonts. According to Diane Cabral, assistant manager of technical support at Bitstream, and Kathy Englar, product marketing manager for the Adobe Type Library, problems with WIN.INI make up the largest segment of technical support calls. Microsoft advises most users to leave WIN.INI alone and let the type foundries' installation programs do the work.

Some applications use their own fonts. For example, Corel Draw features its own elaborate set of outline fonts that you can edit and manipulate in a variety of ways. These fonts only appear in Corel Draw because they only appear in the "CorelDrawFonts" section of WIN.INI; they are not in the Windows .FON screen-font format and do not have the appropriate .PFM metrics files that would make them usable as a general Windows font.

FONT FACTS. Fonts use special metrics files, also called width tables, that tell an application each character's relative size

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so the application can correctly position characters on-screen and during printing. These files often contain kerning information, which are "override" instructions for certain letter combinations. However, you cannot edit the Windows version of these files. For Postscript fonts, you *can* edit the metrics files, which are used by Adobe's and Bitstream's installation packages to create the final font files. Or you can use your application's kerning feature, if available, to alter the default values on the fly.

Windows comes with a set of native fonts that match common fonts such as Times Roman, Courier, Helvetica, Symbol, Modern, and Script. Modern and Script are coarse bit-map fonts available only in selected sizes; they are intended

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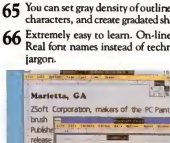

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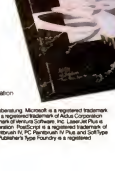

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for simple uses, not for quality documents, Microsoft told us. The other four are close copies of Adobe's Times Roman, Courier, Helvetica, and Symbol. (Symbol is new to Windows 3.0.) When printing Windows Times Roman and Helvetica to a Postscript printer, you'll get the Adobe Times Roman and Helvetica fonts (or, on some printers, Bitstream's Dutch- and Swiss-clone fonts altered to match Adobe's metrics).

You should note that the names of the fonts differ from foundry to foundry because fonts are copyrighted and their names are trademarked, so companies must either license the font or use a slightly different version and a different name. Long before type came to the PC, the standard was to make close copies (often, but not always, with similar names). Typesetters long ago got used to equating names like Helvetica, Helios, and Swiss; personal computer users are just starting.)

You can accidentally confuse the font metrics if you add new fonts from the Fonts application under the Control Panel. This option can create a font metrics file that will not match the printer's, causing awkward spacing and positioning.

This problem usually occurs when installing a font from Windows because the installation alters WIN.INI, but Windows or the Windows application does not always note the change and you may have to restart Windows, according to Bitstream. Users looking for the added font may try Add New Fonts instead of restarting Windows. Using this option to install a font already installed can cause the difference in metrics, Bitstream said. Microsoft advises people to use the installation kits and avoid this menu option, and in Windows 3.0 it is available from the printer dialog box.

The accompanying Remove Fonts option in Windows is handy for getting rid of fonts you don't use, either because of design decisions or because they aren't available on your printer (like Helvetica Narrow, which is not supported by several typesetters).

WHERE THE TECHNOLOGY IS MOVING. For printer fonts, the proposed True Type font technology simplifies the algorithms and expands the range of hinting techniques for outline fonts, promising faster printing across a range of printers and platforms. It is currently unclear when this implementation will be available; when it is available, it will most likely run as part of Windows or as an add-on, according to Microsoft. True Type, Type Director, Speedo, and Type Manager all promise to generate screen fonts on the fly from the same outlines that generate the printer fonts, so what you see on the screen actually matches what you see from the printer.

For a while, at least, these type managers may have to reside on your system together because some applications use one technology and others use another. Bitstream and Adobe both have large user bases; Agfa Compugraphic's connection with Hewlett-Packard assures it a continuing role; the new version (2.0) of Type Director uses outline and bit-mapped fonts for all Hewlett-Packard Laserjet, Deskjet, Paintjet, and other non-HP and non-Postscript printers.

Printer fonts are generated on the fly, but you have to generate screen fonts in various sizes manually; a version called Bullett is also available for applications developers.

Microsoft is uncertain how to position True Type in Windows. It is unsure currently whether to make True Type a part of a future version of Windows or to make it a dynamic linked library (like Speedo, Type Manager, and Type Director) that applications use behind the scenes as needed. It may even be marketed as a separate program. Bitstream's Speedo is available for applications developers for use within applications, although only a few products — such as SPC's First Publisher — currently support it. Speedo generates screen and printer fonts on the fly; for applications that don't use it, screen fonts can be generated manually as can printer fonts for non-Postscript printers.

If these type managers' algorithms and underlying technologies are kept in the public domain as available standards or through technology licenses, applications developers will be able to build interpreters to handle all of them or to convert the outlines into editable graphics. The result of this would be massive type libraries represented by Adobe, Agfa Compugraphics, and Bitstream. Users could then edit and manipulate the type using applications such as Aldus' Pagemaker and Corel Draw (which currently can only edit its own simple fonts). This would open up sophisticated font-manipulation capabilities. □

Galen Gruman has set up an electronic publishing system for a bimonthly trade magazine and a quarterly national association newsletter. He has evaluated MS-DOS desktop publishing and graphics programs for several years.

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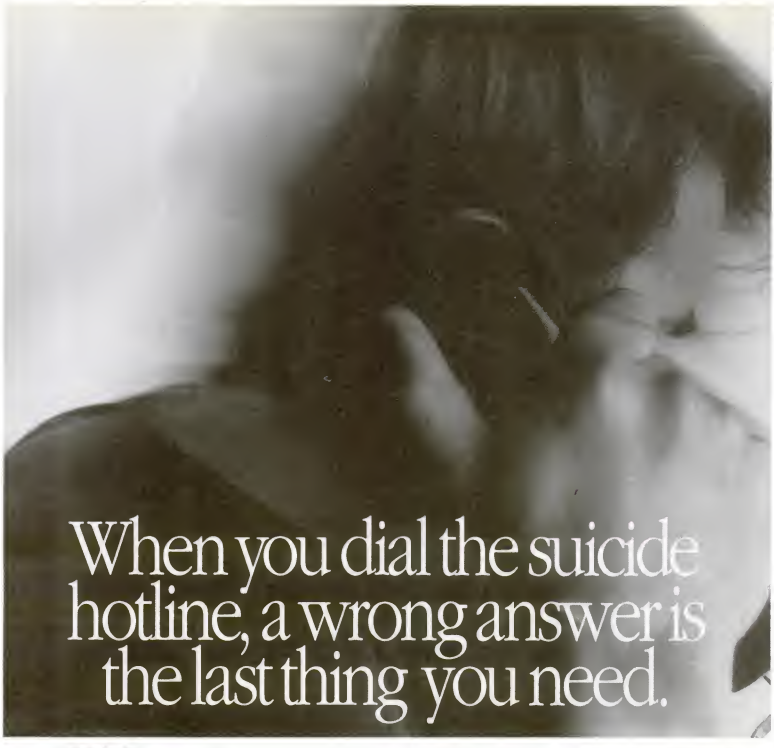

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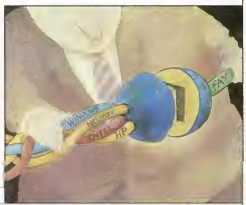

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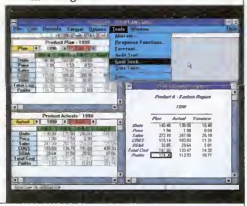

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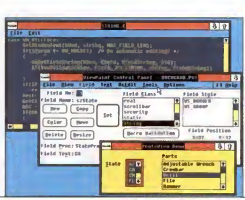

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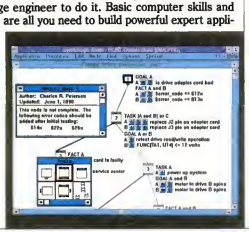

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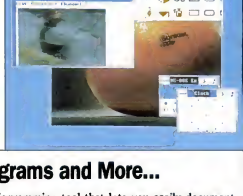

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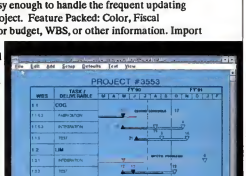

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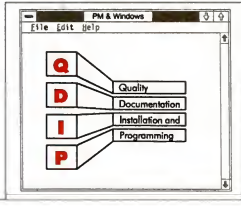

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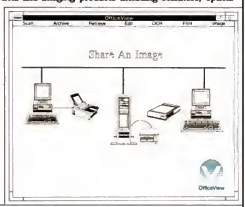

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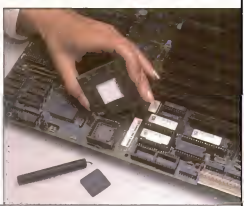

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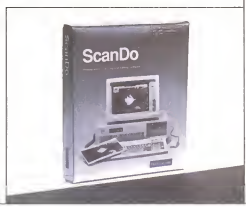

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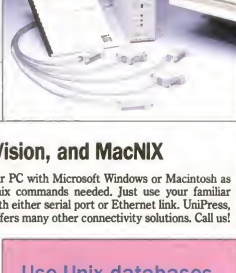

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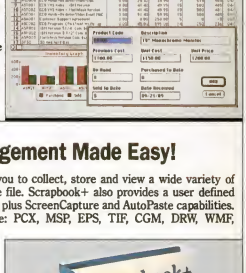

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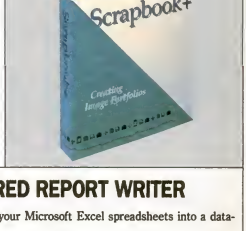

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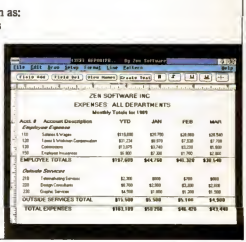

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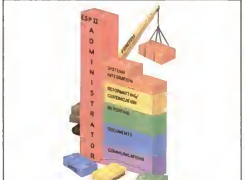

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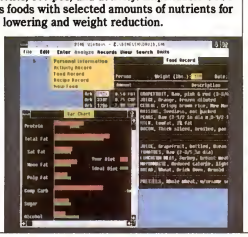

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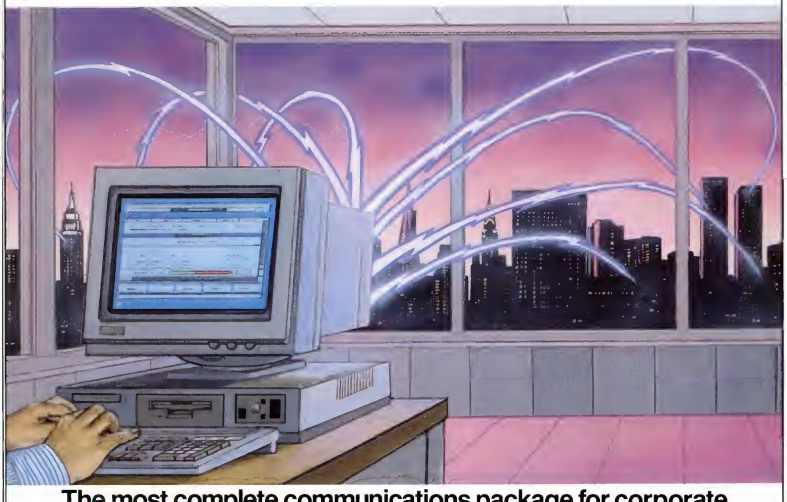

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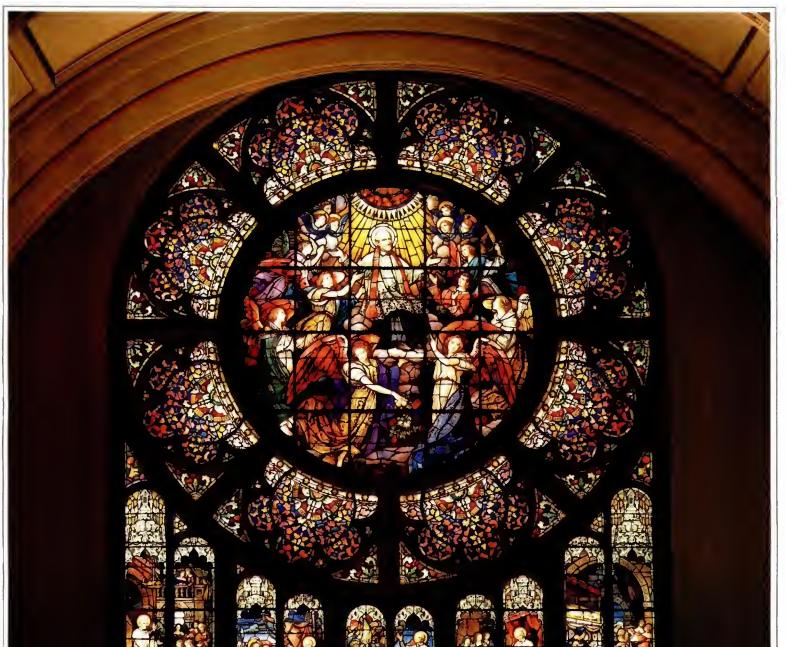

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TO THE EDITOR

Waiting In Line for Support

Rachel Parker's column on area code 900 support lines ("900 Numbers Might Save Firms Money, But They Alienate Buyers," May 14, Page 42) is right on the mark. One very relevant point missed, I believe, is the ubiquitous "call-queueing" system. At $2 per minute, I do not want to hear that my call will be handled by the next available support person. Furthermore, I will not be very tolerant of a support technician who will run my meter while he or she is fumbling for the solution to a more esoteric problem.

In my opinion, if a company such as Lotus or Microsoft charges me $300 to $500 for a package and then expects me to pay for upgrades, they would be wise to assist me in realizing the full potential of their product — either through comprehensive documentation and training materials or phone line support.

Scott D. Green
Wharton School
University of Pennsylvania
Philadelphia

Amiga's Multimedia Leadership

I read with interest your small piece on Commodore Business Machines' recent unveiling of the new Amiga 3000 and Amigavision authoring software (April 23, Page 6). The article, by Paul Worthington, didn't sit well with me. Mr. Worthington opened the article by stating: "Attempting to regain its now-forgotten lead in the multimedia derby, Commodore Business Machines will introduce tomorrow...."

The Amiga has a "now-forgotten lead" in the race for multimedia solutions? This strikes me as a bit unusual, as I've never seen anything in *InfoWorld* that connected the words "Amiga" to "multimedia" and "leader" prior to your April 23 issue. Does this imply that *InfoWorld* has been ignoring the basic tenets of responsible journalism by refusing to report on products that aren't MS-DOS or Macintosh compatible, regardless of how effective, powerful, or revolutionary they are? Or has your journalistic objectivity been tainted by prejudice against a company that has had problems with a "game machine" image, and your reluctance to report on a company that might blemish the professional and businesslike aura that you would like to keep shimmering around your publication?

I am not an Amiga fanatic; I know the machine has some limitations. However, the Amiga does have a powerful combination of features that make it ideal for an effective multimedia platform. I've always looked to *InfoWorld* for objective, professional, and timely information on the whole diverse gamut of products in the computer industry. I hope the same fairness and impartiality that I've seen *InfoWorld* exhibit in the past will extend to an honest, forthright comparison of the Amiga to both Macintosh and MS-DOS multimedia solutions in the future.

Jeff James
Roy, UT

Backups Prevent Viruses

I'm getting tired of the exchange on the dreaded computer virus, both in the trades and from our clientele who are unfortunate enough to believe what they read.

What is the problem? Defense against almost any kind of computer attack is so simple — regular backups.

Backups, which should be made for other reasons anyway, make the threat of viruses and their ilk a nonissue.

Anyone that keeps valuable data on their computer and doesn't back it up often is a fool, or has fools for support personnel. Virus attack is just one of many possible ways to lose your data. If you do regular backups then you can ignore the "Virus!" headlines.

Richard Foulk
President
Pegasus Information Systems
Honolulu

Corrections

The story "Vines Will Support LAN Manager APIs" (May 14, Page 8) incorrectly reported that no Microsoft representative was present at the Banyan press briefing. In fact, Microsoft program manager Steve Madigan attended the meeting.

In "Fashion Houses Turn to the Electronic Drawing Board" (Perspectives, May 14, Page 43), we misidentified Willard Van De Bogart's company name and location. The design company, called Visual Futures, is in Pittsburgh.

The story "Graphics Vendors at Starting Gate in Windows Race" (May 14, Page 1) incorrectly implies that Corel Trace costs $595. Corel Trace is part of the Corel Draw package, which costs $395. Also, the font conversion portion of Corel Draw doesn't keep the original font format on disk. Once converted, the converted font is all there is. No extra hard disk space is taken up.

Please write to Letters, InfoWorld, 1060 Marsh Road, Suite C-200, Menlo Park, CA 94025; MCI Mail: 259-4127; Compuserve: 73267,1537. Include your name, address, and daytime telephone number. Letters selected for publication will be edited for length and clarity.

RESOURCES

◆ JUNE

2-5, Chicago: The 1990 International Summer Consumer Electronics Show (CES) will include electronics hardware and computer software. Location: McCormick Place. Contact: (202) 457-4919.

3-6, Atlanta: Spring Comdex. For information, contact: (617) 449-6600.

3-6, Washington: The World Computing Congress will be held in the United States for the first time in 10 years. Industry experts will discuss new ventures. Contact: Adapso, (703) 284-5355.

4-6, Scottsdale, AZ: The Gartner Group's Personal Computing Conference will cover systems integration, LAN server implementation, and debate on whether "The Minicomputer is Dead." Location: Phoenician Resort. Contact: (203) 964-0096.

4-8, Denver: The Integrated Services Network Conference and Exposition looks at implementing ISDN. Location: Sheraton Tech Center. Contact: (800) 323-1088.

8, Santa Clara, CA: Tools of the Trade, the Apple Macintosh Engineering Conference, features seven seminars. Location: Santa Clara Convention Center. Contact: (800) 346-4699, Ext 400.

10-13, Palm Desert, CA: Nantucket's Clipper developers' conference will have more than 40 sessions. Location: Marriott Resort. Contact: (800) 247-4481.

11-12, Chicago: The National Composition and Prepress Association holds a seminar on color desktop publishing. Location: Ramada Hotel O'Hare. Contact: (703) 841-8165.

12-15, Atlanta: Autodesk Expo '90 includes product tutorials, panel discussions, and an exhibit of third-party software and hardware. Location: Georgia World Conference Center. Contact: (800) 451-1196.

17-21, San Diego: The International Joint Conference on Neural Networks. Contact: Richard Rea, (619) 222-7447.

19-21, New York: PC Expo will have an international focus in 1990. The show will participate in the Foreign Buyer Program of the U.S. Department of Commerce, and will feature an International Business Center. Location: Javits Center. Contact: Annie Scully, (800) 444-EXPO.

25-28, Gaithersburg, MD: Compass '90, the Fifth Annual Conference on Computer Assurance: Systems Integrity, Software Safety and Process Security, is sponsored by IEEE. Location: The National Institute of Standards and Technology. Contact: (301) 975-3340.

26-28, Beverly Hills, CA: Seybold Seminars' Digital World looks at digital use in consumer electronics, entertainment, and home computing. Location: Beverly Hilton Hotel. Contact: (213) 457-5850.

◆ JULY

8-12, San Francisco: The Information Center Conference offers full-day workshops including technical training and networking. Location: Moscone Center/ Marriott Hotel. Contact: (617) 542-0146.

16-18, Boston: The Fourth Annual Engineering Workstations Conference is for technical managers, staff, and buyers in engineering and scientific fields. Location: Hynes Convention Center. Contact: Angela Carter, (213) 450-0500.

17-19, New York: The Macintosh/New York Conference is aimed at the corporate and professional user. Location: Jacob Javits Convention Center. Contact: (617) 290-0400.

InfoWorld welcomes notices of national conferences, trade shows, and meeting schedules of professional data processing, MIS, information center, and microcomputer management associations. Send notices to Resources, InfoWorld, 1060 Marsh Road, Suite C-200, Menlo Park, CA 94025. No local training or education seminars, please.

A USER'S VIEW ▪ By Jerry Pournelle

Mother's Days Come and Go, but Windows is Here to Stay

Suffice it to say that my duties at the Lowell Observatory were responsible for our rescheduling Mother's Day at Chaos Manor. We took Roberta out to dinner; but as it happened, of her four boys, only one came along; Alex brought his fiance; and Peter Flynn, who used to be the editorial assistant at Chaos Manor, joined us too, meaning that we talked about the future of little computers. So it goes.

There's a lot to talk about, actually.

DEVELOPING FOR WINDOWS 3.0. First item: Last week, at long last, Microsoft brought out Windows 3.0. By the time you read this, there will have been parties in New York and Los Angeles, and probably three other places as well, and Windows 3 will be a shipping product. Meanwhile, third-party developers have been frantically trying to prove to Microsoft that their stuff works properly under Windows 3.0 so they could be included in the demonstrations and hoopla.

Of course, some third-party developers are trying not to be included. A couple of friends — call them Dave and Frank — have had Windows 3.0 Development Kits for about a year now. They found many bugs, which they duly reported, but also kludged up work-arounds — only to find that all too often Microsoft had already kludged the bug fix, and the Microsoft kludge wouldn't work with the Dave-and-Frank kludge. The last time that happened, Dave said, "I've had it. We wait for a released and shipping product before we invest any more of our time in developing Windows stuff," and that's exactly what they've done. I gather they are not alone.

Windows 3, for those few who haven't heard already, theoretically runs Windows applications in protected mode, and also lets you run most standard DOS applications at the same time; indeed, to have, like Desqview, multiple programs going at once. In fact, it's more than theory; we've done it here at Chaos Manor.

That's the good news. The bad news is that installation is a pain — although nowhere near the pain ordinary Windows was — and an awful lot of both DOS and Windows apps think they won't run properly with Windows 3 — or at least with the version of Windows 3.0 that I've had for the past few weeks. Notice I said "think": Windows reports that it's unsure about an application not specifically designed for Windows 3, while some applications check the version of Windows and complain on their own. One such is the new Windows version of Ami: It appears to work all right, but it's convinced I need a new version of the program.

DOS STAYS. "Windows," Alex said at dinner, "seems doomed to success. Meaning we'll have DOS with us a few more years."

At this point Peter Flynn burst into tears. He's not one of DOS's biggest fans. Peter uses desktop publication applications on PC-compatible machines, so he knows more than most about DOS limits. He's also adventurous, and one wonders if a lot of his antipathy for DOS doesn't come from overfamiliarity.

The fact is, though, that DOS has a lot going for it. Inertia, to begin with, and there's a lot of that. Next, all the major players have signed off on the new DOS extension standards. Phar Lap, Rational Systems, Quarterdeck, Borland, Intel, Lotus, and Locus, and just about everyone else in town, including Microsoft, have agreed on ways to make DOS behave usefully in 32-bit applications. With that many players behind it, the new standard is going to fly.

Of course, Microsoft isn't the only company making a long-awaited announcement. Digital Research, which obviously has the right to publish DOS clones without worrying about their look and feel, is reported to be about to release a new DR-DOS that's neater and sweeter: specifically, one that results in a much larger TPA (temporary program area) available compared to DOS.

Anyway, although Digital Research has fallen way behind in recent years, there are still some good programmers working in Monterey. The company has been acting as if it couldn't market eternal life, but that doesn't have to be a permanent situation; and if the new DR-DOS is as good as some of the preliminary reports indicate, that too will help give DOS a new impetus.

APPLE AWAKENS. Other news: It takes a while for pain signals to get from the tail up to the head of a dinosaur, but eventually it does happen: Specifically, Apple got the news that the company is in trouble in the education markets it used to dominate. The result was new low prices for low-end Macs, with the Mac Plus now selling at something approaching reasonable. The theory is that this will hold the fort until the new Apple II-compatible Mac comes out. Certainly, it's about time Apple worried about market share and not just quick profits.

MAC TOOLS. That's the low end. On the high end, the Mac IIfx is expensive, but it sure packs a lot of power. Tonight we've been playing with Bruderbund's latest creation, Typestyler, which is a program that lets you fiddle about with fonts and type layouts. This is one of those programs you don't know you need until you have it.

Typestyler does shadowing, shading, texturing, and all that sort of thing. You can bend, twist, curl, and generally distort text any way you like. After a couple of hours of fooling around with Typestyler, Alex was able to get some fairly dramatic effects, such as a "panoramic" line of text that looks as if the ends of the line are closer than the middle. He thinks the shadowing could be better, in that it sometimes takes fiddling about to keep the shadow from one letter from interfering with the next, but all told, if you're serious about typesetting effects, you'll want Typestyler.

However, you'll also want serious horsepower; even on the IIfx, Typestyler isn't particularly fast, and my guess is that it would take patience to use it with an older and slower machine. On the other hand, if you have an old slow Mac, you're used to waiting.

Our subjective impression is that Typestyler has some minor conflicts with Adobe Type Manager, and is quicker with Type Manager turned off. If we're right, then the difference may be dramatic with slower machines..

While Alex was playing with Typestyler on the Mac IIfx, I worked on Windjose's Weatherbrief, which is software including the communications package to let you plug into Weatherbank, the on-line weather database used by your favorite TV meteorologist. The cost is between 20 and 50 cents a minute depending on time of day and baud rate. Given those rates, if you do access that database much, you'll save money with Weatherbrief, which is to Weatherbank as Aladdin is to the GE Genie net: it's a front end that lets you tell it what you want and don't want, then send the program out to connect on-line and get just what you need in the most efficient manner. Once that's done and you're off-line, you can view your data at leisure without paying for connect time.

All told it was a great Mother's Day, at least for Alex and me.

Jerry Pournelle is a noted science fiction writer and computer columnist. The views expressed are his own.

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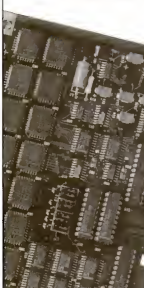

SAFE. The fear of losing important data can be eliminated because FLASHDISK is *nonvolatile*. No batteries are required. Data saved can withstand power losses and surges, vibrations, dust, humidity, and extreme temperatures. FLASHDISK can be removed and returned to a system without data loss or corruption.

ROWS. (Read Often Write Seldom) describes FLASHDISK which is perfect for software programs and data bases that are read intensive and may require occasional updating but need to be safe from system crashes. Write Seldom is descriptive because the write times are 1 megabyte per minute, and the chips have only been tested from one hundred thousand to one million rewrites without failure.

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PRICE. FLASHDISK's retail price is $1500.00 for a 2 megabyte unit, $2700.00 for a 4 megabyte unit, and $4900.00 for an 8 megabyte unit; each unit comes with a one year warranty.

For more information or technical questions: *1-800-662-6802* or FAX 205-533-6353

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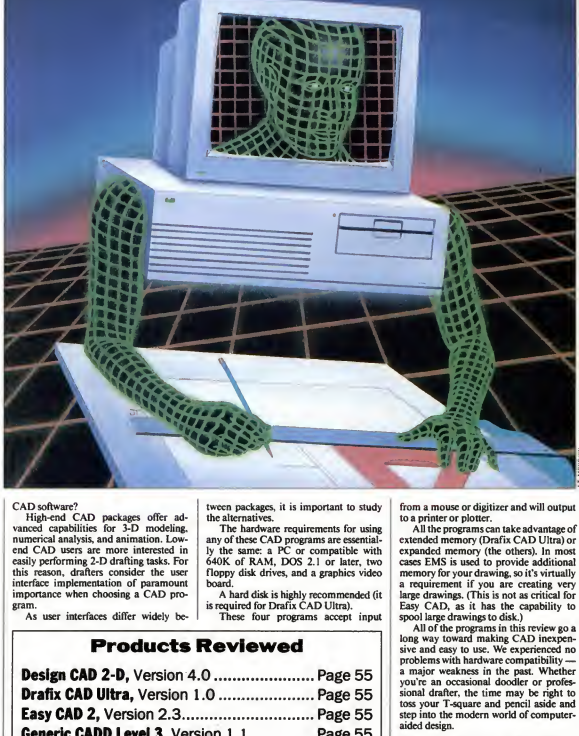
PRODUCT COMPARISON

Computer-Aided Design

InfoWorld examines four CAD packages with the power and ease of use that novices need and expert drafters demand.



J.T. MCGRAW

BY JAMES R. WHITE REVIEW BOARD

In the early 1980s, Autodesk broke ground with its CAD package for the PC, Autocad. Since then, CAD has gained a following of a variety of users with diverse needs.

At the high end, architects and engineers exploit the advanced 3-D capabilities of products such as Autocad or Versacad. (For a review of high-end CAD programs, see our product comparison of July 17, 1989, Page 62.)

Professional and nonprofessional drafters who don't care to mortgage the farm on expensive hardware, and who don't wish to struggle with a product like Autocad, can reap the benefits of computer-aided drafting — such as easier drawing modification and storage — by using low-end CAD software.

OUR LINEUP. In this product comparison, we review the four low-end CAD packages that drew the highest percentage of interest and use in an *InfoWorld* survey of 1,000 readers who buy and use CAD software. Their top choices were Drafix CAD Ultra, Design CAD, Easy CAD, and Generic CADD Level 3.

These packages are capable of generating the same kinds of drawings (without some of the more advanced 3-D capabilities) as the high-end packages, and in some instances probably are more cost-effective.

One certainty is that the learning period is much shorter with these packages compared to their higher-cost cousins.

All four packages can produce 2-D drawings; we look at 3-D add-ons for three of the four. (See sidebar, Page 61.) The programs vary in the way they strike a balance between power and ease of use. Their prices also vary considerably, from $170 to $400.

Users hungry for more power, but unwilling to shell out a few thousand dollars for one of the high-end packages, and non-drafters looking for an easy introduction to CAD, should take a look at Fastcad and Autosketch, respectively. (See sidebar, Page 60.)

MAKING THE SELECTION. Before choosing a low-end CAD package, you should ask yourself a few questions. Will you be using the package occasionally or often? Is customization important? Is a large and capable symbol library essential? Are database features (attributes) and text handling important? Can you do without the additional capabilities of high-end CAD software?

High-end CAD packages offer advanced capabilities for 3-D modeling, numerical analysis, and animation. Low-end CAD users are more interested in easily performing 2-D drafting tasks. For this reason, drafters consider the user interface implementation of paramount importance when choosing a CAD program.

As user interfaces differ widely between packages, it is important to study the alternatives.

The hardware requirements for using any of these CAD programs are essentially the same: a PC or compatible with 640K of RAM, DOS 2.1 or later, two floppy disk drives, and a graphics video board.

A hard disk is highly recommended (it is required for Drafix CAD Ultra).

These four programs accept input from a mouse or digitizer and will output to a printer or plotter.

All the programs can take advantage of extended memory (Drafix CAD Ultra) or expanded memory (the others). In most cases EMS is used to provide additional memory for your drawing, so it's virtually a requirement if you are creating very large drawings. (This is not as critical for Easy CAD, as it has the capability to spool large drawings to disk.)

All of the programs in this review go a long way toward making CAD inexpensive and easy to use. We experienced no problems with hardware compatibility — a major weakness in the past. Whether you're an occasional doodler or professional drafter, the time may be right to toss your T-square and pencil aside and step into the modern world of computer-aided design.

James R. White is a Portland, Oregon-based CAD consultant for major corporations. He has a BSEE from USC, has worked for IBM, and has been designing computer interfaces for 25 years.

Products Reviewed

Design CAD 2-D, Version 4.0 ..... Page 55
Drafix CAD Ultra, Version 1.0 ..... Page 55
Easy CAD 2, Version 2.3 ..... Page 55
Generic CADD Level 3, Version 1.1 ..... Page 55
Executive Summary ..... Page 54
InfoWorld Report Card ..... Page 54

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Executive Summary

The four packages evaluated in this review are capable of generating excellent quality 2-D drawings for all drawing applications. However, unlike their high-end counterparts, the low-end packages vary significantly in appearance, capability, function, and price.

The ultimate goal of using CAD is to improve productivity. Thus, when rating the four low-end CAD packages in this review, we paid a great deal of attention to each program's success at making computer-aided drafting as simple and efficient as possible.

Generic CADD Level 3 is the overall ratings winner and is the clear choice for production drafting. Once users learn Generic CADD Level 3, they can easily retain it without having to keep going back to the reference material.

Symbol handling is superb, and speed is excellent. Users trained on Generic CADD Level 3 are able to move easily into Autocad, which is sold by Generic Software's parent, Autodesk, with little training; drawing transfer between the two is excellent. The diverse coordinate entry selection capability will be greatly appreciated by anyone experienced with the units entry found in most CAD programs.

Although the price is a bit higher these days (Generic CADD was originally sold for under $100), Generic CADD Level 3 at $399 is a tremendous bargain compared to the high-end packages and still a top value among the low-end packages. With a little work on the clumsy selection and management of files and the addition of associative dimensions, this program would be a real powerhouse.

Easy CAD 2 is the clear winner of all these packages for look and feel. Easy CAD provides you with intuitive pull-down menus and dialog boxes. Drawing colors can be changed on the fly. Easy CAD's consistent and intuitive interface makes it easy to be successful when you're first learning the program.

Unfortunately this simplicity can be a downfall for the more advanced user, since more keystrokes are required per command. But programmability is strong in Easy CAD, making it possible to develop shortcuts in the command structure as the user becomes more familiar with the program.

All in all, the Easy CAD user will have to be willing to go through a few extra steps to get the job done, but will be rewarded with a flexible and powerful program at a very low price.

Design CAD 2-D was the most powerful of all the programs we tested, but it was also the most difficult to learn. Yet if you're looking for a program that has a complete programming language, IGES conversion, multiple view windows, attributes, and plot sorting, you won't find any others under $500 with this much to offer.

However, many of the basic functions CAD users take for granted are not executed very well, such as text editing and entity selection. Also, the program handles symbols inefficiently, which contributes to its being the slowest program of the group. Design CAD performs some tasks in unique and perhaps unfamiliar ways, though with its complete programmability you could conceivably customize Design CAD to work in a manner more to your liking.

Drafix CAD Ultra is a reasonably powerful CAD program that features a unique interface. All Drafix commands must be selected from on-screen menus. This menu structure leads you through the steps necessary to complete each command. Unfortunately it can take up to five steps to draw a simple line. Once familiar with command execution, it's easy to get back into the program after an extended absence without a significant loss of productivity.

In addition, Drafix has top file management, attributes, and symbol handling features. But in spite of its powerful features, Drafix's menu-intensive interface might distract you from noticing them. The interface is so inefficient that we cannot recommend Drafix for heavy use such as production drafting.

REPORT CARD — INFO WORLD

Low-End CAD Software

	(InfoWorld weighting)	(Your weighting)	Design CAD 2-D Version 4.0	Drafix CAD Ultra Version 3.05	Easy CAD 2 Version 2.3	Generic CADD Version 1.1
List Price			$299	$395	$169.95	$399.95
Performance						
Drawing tools	(75)	( )	Very Good	Good	Very Good	Very Good
Editing tools	(75)	( )	Satisfactory	Good	Very Good	Very Good
Placement tools	(50)	( )	Good	Satisfactory	Very Good	Excellent
Programmability	(50)	( )	Excellent	Poor	Very Good	Satisfactory
Input/output capabilities	(50)	( )	Very Good	Very Good	Good	Very Good
Processing speed	(50)	( )	Satisfactory	Good	Good	Excellent
Documentation	(75)	( )	Satisfactory	Good	Very Good	Good
Ease of learning	(125)	( )	Satisfactory	Very Good	Very Good	Good
Ease of use	(150)	( )	Good	Satisfactory	Good	Very Good
Error handling	(75)	( )	Good	Very Good	Satisfactory	Very Good
Serviceability						
Support policies	(50)	( )	Very Good	Very Good	Good	Very Good
Technical support	(50)	( )	Very Good	Good	Poor	Very Good
Value	(125)	( )	Very Good	Satisfactory	Very Good	Very Good
Final scores			**6.4**	**6.0**	**6.6**	**7.3**
Use your own weightings to calculate your score						

GUIDE TO REPORT CARD SCORES

InfoWorld reviews only finished, production versions of products, never beta test versions.

Products receive ratings ranging from unacceptable to excellent in various categories. Scores are derived by multiplying the weighting (in parentheses) of each criterion by its rating, where:

Excellent — 1.0 — Outstanding in all areas.
Very Good — 0.75 — Meets all essential criteria and offers significant advantages.
Good — 0.625 — Meets essential criteria and includes some special features.
Satisfactory — 0.5 — Meets essential criteria.
Poor — 0.25 — Falls short in essential areas.
Unacceptable or N/A — 0.0 — Fails to meet minimum standards or lacks this feature.

Scores are summed, divided by 100, and rounded down to one decimal place to yield the final score out of a maximum possible score of 10 (plus bonus). Products rated within 0.2 points of one another differ little. Weightings represent average relative importance to *InfoWorld* readers involved in purchasing and using that product category. You can customize the report card to your company's needs by using your own weightings to calculate the final score.

Scoring CAD Packages For Drafters

HOW WE TEST — LOW-END CAD SOFTWARE

When selecting packages for this comparison, we considered the needs of professional drafters without any prior CAD experience. None of the packages requires investing in a digitizing tablet or other expensive hardware such as a math coprocessor.

We tested the packages with an Everex 12-MHz 286 with 4 megabytes of RAM, a Logitech bus mouse, a 60-megabyte hard disk drive, a Genoa 6400 640-by-480 VGA card, and a NEC Multisync 3D monitor.

We graded the systems with a report card modified from the one used in our last product comparison of CAD products (July 17, 1989, Page 62), with 3-D performance omitted and some features added to address the unique needs of low-end CAD users. We also boosted the score weightings of ease of learning and ease of use, two important elements of low-end software. Other weightings are based on the results of a survey of 1,000 *InfoWorld* readers involved in purchasing and using CAD software.

Some of the packages provide all the basic capabilities required of a low-end CAD program. However, other programs force the user to purchase certain utilities separately to bring the program up to par. We take this into account when scoring the value of each product.

PERFORMANCE:
We looked at six performance subcategories: drawing tools, editing tools, placement tools, programmability, input/output capabilities, and processing speed.

Drawing tools: In addition to basic point, line, text handling, and dimensioning tools, packages must perform linear or circular copying, hatches, and fills for a satisfactory score.

Scores improve for programs with more extensive tools or numerous drawing shortcuts such as copying in rectangular arrays (multiple columns of objects), or circular arrays (multiple rings of objects). If a change in an object's size scales its respective dimensions (associative dimensioning), or adjusts its hatch or fill (associative hatches and fills) to conform to the new shape, we award bonus points.

Attributes, a string of text attached to an object (or symbol), also raise the score. Attributes can be listed or exported to spreadsheets or databases. For example, by attaching the word *door* to the appropriate symbol, the number of doors in a floor plan could be exported to a spreadsheet and counted.

Efficient symbol handling (treating repeated symbols as references to a single memory location) also upgrades the score, because it conserves RAM; this allows for manipulation of larger drawings.

Editing tools: For a satisfactory score, packages must handle the standard trim, extend, fillet, and chamfer capabilities. The products earn higher scores for more flexible options for editing text and graphics, and for selecting entities or groups of entities. We also score the number of possible drawing layers and colors under editing tools.

Placement tools: For a satisfactory score, programs must provide x-y coordinate, relative coordinate (usually to the

How We Test, Continued on Page 60

Design CAD 2-D
Version 4.0

Design CAD, Version 4.0 features a long list of capabilities common to high-end CAD programs. None of the other low-end packages includes features like a complete programming language, multiple view windows, attributes, and IGES file conversion. The program's high degree of programmability makes it customizable for virtually any drafting application.

Although the program boasts an impressive list of features, the functions most often accessed by drafters, such as symbol handling and entity selection, are more cumbersome to use than in programs like Easy CAD and Generic CADD.

Drafix CAD Ultra
Version 1.0

Drafix CAD Ultra's interface was the least intimidating of the CAD packages reviewed here. Its unique menu structure provides the user with a lot of information — a great help for first-time users.

However, the interface becomes bothersome when the user gets past the learning stage. After repeated use, the multitude of menus make even simple line drawing a cumbersome process.

Two other CAD packages are offered by Foresight Resources: Drafix CAD Qwkstart ($129), a low-end version of Drafix CAD Ultra, and Drafix Windows CAD ($695) for Microsoft Windows.

Easy CAD 2
Version 2.3

The Easy CAD user interface has a more refined feel to it than Drafix CAD Ultra. This makes the drawing screen much less cluttered than the menu-filled Drafix CAD screen.

To a greater degree than Generic CAD, this product allows users to customize the program to their particular needs. While not as programmable as Design CAD, Easy CAD provides drafters with ample customization tools.

Nevertheless, the menu structure can be too simple. Sometimes, relatively unrelated commands are grouped together. For instance, Point, Symbol, and Group are all located on the Copy pull-down menu.

Generic CADD Level 3
Version 1.1

Of the four companies whose products we looked at, Generic Software seems to have taken the greatest pains to design a user interface tailored to the needs of professional drafters. Users can choose a type of command entry by selecting from the heirarchical menus or inputting the two-letter mnemonic command codes.

The program offers a number of flexible drawing tools. It concentrates its efforts on the tasks most often accessed by drafters. Users with different needs may prefer products like Design CAD or Easy CAD, which offer more customization.

While professional drafters will find Generic CADD Level 3 a joy to use, novice or occasional users can expect a steeper learning curve than with a product like Drafix CAD Ultra.

PERFORMANCE: DRAWING TOOLS

The program features circular and linear copying, but not in arrays. A set of 43 hatch patterns are available, and you can also create your own patterns. Nevertheless, hatching requires you to trace the outline of the object to hatch. By using vector arcs, the user can trace more complex objects, but this is still not as elegant as full associative hatching.

Design CAD's comprehensive set of associative dimensioning options for linear, angular, diametrical, and radial dimensions greatly improve productivity. Linear dimensions can be baseline, successive, or aligned with the object.

Design CAD's unique Curve command allows dynamic visualization of a curve as it is being created. Once two points have been placed, the user can see how the curve will appear relative to the dynamic position of the cursor.

When creating entities that require multiple points, such as arcs, you can press the Escape key to back up one point at a time. This eliminates the need to erase an entity and start over.

Design CAD features the capability to place text information in a drawing in the form of attributes. The Materials List utility included with the program extracts all attributes from a drawing. This utility can count them, or output the list to the screen, a printer, or an ASCII file on disk. Cost estimates are a breeze.

When compared to the other programs, Design CAD has some very flexible options for text placement. Text can be placed at any scale or slant, fit between two points, or even placed around an arc. Text can also be centered, or right or left justified.

More than 500 symbols are supplied with the program, including symbols for architectural, mechanical, and electronics drawings. These are useful, but not complete or accurate enough for professional use.

Design CAD has the most inefficient symbol handling of all these packages. It treats symbols as drawings. Thus, memory is wasted if more than one occurrence of a symbol is placed in a drawing. If you want to rotate a symbol, it must first be blocked; this gets tedious and isn't handled as well as in the other programs.

In addition to the included symbols, 29 inexpensive symbol libraries are available separately from American Small Business Computers. These libraries appear to be more complete than the symbols supplied with the package.

Score: Very Good.

Design CAD, Continued on Page 56

Drafix CAD Ultra has a full set of single and double lines and line types, and a set of tangent, perpendicular, parallel, and angled lines. While this program can do virtually anything required of it, it frequently requires many steps to do things that should be simple and intuitive.

It is possible to carry out all of the necessary drawing tasks, such as creating entities, hatching, and dimensioning. All performs acceptably, but are slowed by the repetitive user interface.

Hatches and fills can be created, but require special attention to selecting the border. Fifteen hatch patterns are included. Rectangular arrays are not possible, but circular arrays can be created using the Copy and Rotate commands.

A great number of dimensioning options are available, but every dimensioning is not associative. Dimensions can be linear (horizontal, vertical, or aligned), angular, or for a radius or diameter. Linear dimensions can be in chain, baseline, or ordinate form.

Drafix CAD Ultra offers extensive attribute capabilities. These compensate for some of the program's faults. You can also export and import the attribute information in or out of spreadsheets and databases.

There are 19 fonts supplied with the program, ranging from simple to complex. You can also import text files from popular word processing programs.

The program supports centerline dimensioning of circles and arcs. Dimension text can be either right, center, or left justified.

The program's line control is fairly extensive and lacks only the capability to easily place a point at an arbitrary position on a line, arc, or circle. Drafix CAD Ultra forces the user to make more selections to accomplish this often-used task than the other programs. Experienced users will quickly find the operation cumbersome.

A library consisting of about 400 symbols for architectural, electrical/electronic, machinists, and office layout is included. While the symbols are not very detailed, they are generally well done, although they would be easier to find if they were named, rather than numbered.

Although symbol libraries tend to be more useful when customized, the Drafix libraries are better than most symbols included with low-end CAD programs.

Score: Good.

Drafix CAD, Continued on Page 56

Easy CAD offers users a number of powerful drawing tools. Of the four programs, it's the only one to offer automatic circular and rectangular arrays. You can also create rotated copies of selected entities at any specified angle.

Dimensioning is one area where the Easy CAD user interface is truly a blessing. When creating dimensions, there are always parameters that must be specified; the Easy CAD pull-down menus and dialog boxes make this a breeze.

Dimensions are associative and can be horizontal, vertical, parallel, or angular. Also, you can specify the text height, font, number of decimal places, arrowhead type, angle and size, and how the text is positioned.

The program has numerous text handling features. Three text fonts are included: Standard with straight lines, Fancy with smooth curves, and Smooth, a modern sans-serif font.

The program also has associative hatches and fills. Only closed, individual entities can be filled or hatched, such as boxes, circles, wide (parallel) lines, polygons, etc. You cannot fill an irregular group of entities.

Easy CAD does not have any symbols included with it, although there are some available from third-party developers. For $95, Evolution Computing sells a symbols library called the Mechanical Design Environment, which was developed by a third party.

Flexible describes how Easy CAD handles symbols. They can be loaded as Parts, which are grouped together for optimum speed.

Alternatively, the Symbols feature can be used if the user wants to maximize memory use. Using Symbols, however, results in a significant loss of speed.

Score: Very Good.

Easy CAD 2, Continued on Page 56

Generic CADD's fills and hatches are extremely flexible and powerful, giving the user the opportunity to hatch or fill closed groups of entities by simply placing a window around them.

Generic has a wide variety of hatches to choose from that can be of various colors, scales, and rotations. You can also create your own hatch patterns.

Dimensioning is definitely not one of Generic's strengths. It does not have associative dimensioning capabilities.

Generic CADD has the most comprehensive handling of lines of any of the products tested. The one exception is that you cannot create your own line types. A good variety of widths and scalable line types are readily available.

Parallel lines can also be created at any desired width. For example, when drawing walls, the double line width can be referenced from the first line, midway between the double lines, or from the second line.

Since lines are usually the most common entity in a drawing, Generic CADD defaults to the Line Draw mode until a specific command is selected. This further reduces the number of commands and keystrokes needed to create a drawing.

Unlike the other CAD programs we reviewed, Generic CADD does not create text strings but forms each character as a separate entity. This makes editing very fast, but unfortunately it makes text-intensive drawings larger than they might otherwise be.

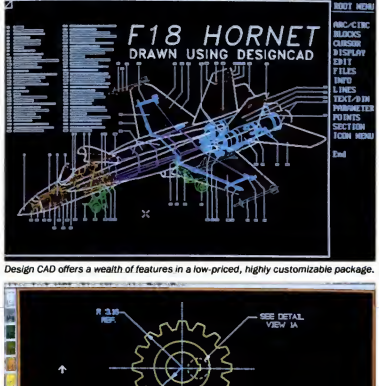
You can also create your own fonts with Generic CADD using the normal drawing and editing commands.

Generic CADD comes with seven fonts ranging from simple to complex styles. More than 15 additional fonts can be purchased from Generic Software for a reasonable price.

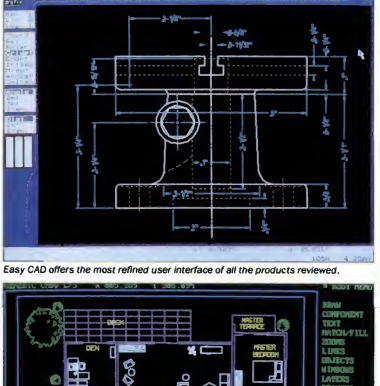
A handful of sample symbols are included with the program. Generic Software sells 26 professional symbol libraries for architectural, electronics, mechanical, structural, and general business drawing applications.

Generic CADD symbols are called Components, whose usage and manipulation are part of the program's strengths. Components are created and saved as separate entities with a special file name extension. You can select components by entering their names or by creating a menu of names so they can be loaded by a mouse click. **Score: Very Good.**

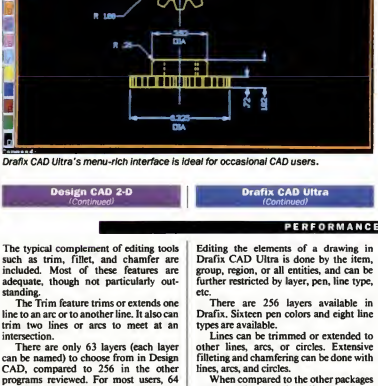
Generic CADD, Continued on Page 56



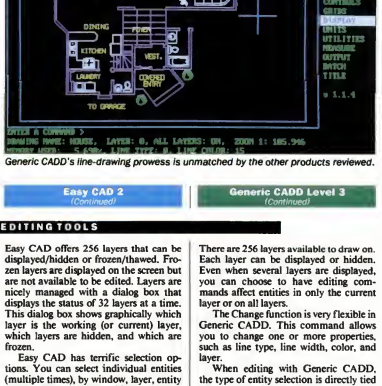
Design CAD offers a wealth of features in a low-priced, highly customizable package.



Easy CAD offers the most refined user interface of all the products reviewed.



Drafix CAD Ultra's menu-rich interface is ideal for occasional CAD users.



Generic CADD's line-drawing prowess is unmatched by the other products reviewed.

Design CAD 2-D (Continued)	Drafix CAD Ultra (Continued)	Easy CAD 2 (Continued)	Generic CADD Level 3 (Continued)

PERFORMANCE: EDITING TOOLS

The typical complement of editing tools such as trim, fillet, and chamfer are included. Most of these features are adequate, though not particularly outstanding.

The Trim feature trims or extends one line to an arc or to another line. It also can trim two lines or arcs to meet at an intersection.

There are only 63 layers (each layer can be named) to choose from in Design CAD, compared to 256 in the other programs reviewed. For most users, 64 layers is still more than they will ever need. However, many professional associations (especially for architectural applications) are developing standards based on having 256 layers, so this could be a real obstacle for some production drafters.

Editing functions on simple sets of entities can be carried out by selecting entities with one of the Section commands. This is similar to performing a window selection in other programs.

Design CAD includes several innovative features, the most useful of which is the Clip command. This allows you to cut a rectangular piece out of your drawing that can be copied to another part of the

Design CAD, Continued on Page 57

Editing the elements of a drawing in Drafix CAD Ultra is done by the item, group, region, or all entities, and can be further restricted by layer, pen, line type, etc.

There are 256 layers available in Drafix. Sixteen pen colors and eight line types are available.

Lines can be trimmed or extended to other lines, arcs, or circles. Extensive filleting and chamfering can be done with lines, arcs, and circles.

When compared to the other packages in this review, Drafix offers top-notch text editing capabilities. Text is handled as strings that are fully editable. Pop-up windows make editing all types of text a breeze.

A mask command is available to hide a group, region, layer, pen, line type, or item from view and protect it from editing.

The group and region functions act as selection sets, similar to a window selection in other programs, except that in Drafix CAD Ultra the implementation, while quite flexible, is a bit more cumbersome.

The Window command in Generic CADD and the Group command in Easy

Drafix CAD, Continued on Page 57

Easy CAD offers 256 layers that can be displayed/hidden or frozen/thawed. Frozen layers are displayed on the screen but are not available to be edited. Layers are nicely managed with a dialog box that displays the status of 32 layers at a time. This dialog box shows graphically which layer is the working (or current) layer, which layers are hidden, and which are frozen.

Easy CAD has terrific selection options. You can select individual entities (multiple times), by window, layer, entity type, color, the last entities picked or drawn, or all entities. Boolean operators (e.g., and; or; not) can be used to add or delete items from a group.

The Change command is very flexible when it is used with the selection box and logical operators. However, you can only change one property per command: either layer, line style, color, wide line width, text height, text angle, text font, text content, dimension text position, or number of decimal places.

A Bend command is available to create "nodes" or corners in some entities. The Connect command is useful for fitting an entity to another (it combines Move, Scale, and Rotate).

Easy CAD 2, Continued on Page 57

There are 256 layers available to draw on. Each layer can be displayed or hidden. Even when several layers are displayed, you can choose to have editing commands affect entities in only the current layer or on all layers.

The Change function is very flexible in Generic CADD. This command allows you to change one or more properties, such as line type, line width, color, and layer.

When editing with Generic CADD, the type of entity selection is directly tied to the command. For example, you can choose to perform a "Window Move" or an "Object Move." Other programs force users to execute a block or window command before they can move an object. This is just one more example of the program's flexibility in adjusting to drafters' needs.

The Trim and Extend functions are especially flexible because lines and arcs can be trimmed or extended to meet other lines, arcs, or circles. Lines and arcs can also be trimmed or extended to any point, even if the point is not on an existing entity.

The Autofillet command automatically fillets double lines (which usually

Generic CADD, Continued on Page 57

Design CAD 2-D (Continued)

drawing or saved to a file. Design CAD breaks all entities so they end at the clip border. This feature is ideal for creating detailed views of a complex drawing. **Score: Satisfactory.**

Drafix CAD Ultra (Continued)

CAD are more refined and natural to use. Still, in Drafix CAD Ultra a group of elements can be defined and edited as a single element until the group is cleared. **Score: Good.**

Easy CAD 2 (Continued)

The Trim command, which also extends, is unusual in Easy CAD. One deficiency is that only lines can be trimmed, not arcs. The selected line is trimmed to a point, not to another entity, unless a snap is used to specify a point on an entity. **Score: Very Good.**

Generic CADD Level 3 (Continued)

denote walls) with arcs as they are created. The double lines can also be automatically filled during construction.

Once drawn, double lines can be modified with the Corner Clean command, which aids in trimming stray lines. **Score: Very Good.**

PERFORMANCE: PLACEMENT TOOLS

Of all the CAD programs we reviewed, Design CAD is the only one that displays multiple drawing views on the screen at the same time. Up to six viewing windows can be opened — this is a very useful feature commonly found in high-end CAD programs.

Coordinates can be entered from the keyboard in absolute, relative, or polar formats. Unless a special command is used, Design CAD interprets "relative" coordinates as relative to the cursor's current position, instead of the more common way as relative to the last point entered (the vendor plans to employ the latter method in Version 4.1). Unless you keep this in mind, moving the cursor prior to command execution could cause the next point to be entered inaccurately.

All the necessary snaps are included for finding nearest points, intersections, nearest entities, and midpoints. There are also features for creating parallel, perpendicular, and tangent lines. **Score: Good.**

Coordinate entry in Drafix CAD Ultra is well done with the choice of absolute, relative, or polar modes of entry. The selection remains in place until another type of coordinate entry is selected.

However, point placement is quite weak. You cannot efficiently place a point anywhere in the drawing. This greatly reduces drawing productivity because certain tasks require many steps.

For example, when dimensioning, you must select the type of snap (usually endpoint) necessary to find the points for the dimension. Then, to place the text for the dimension, you must again change the snap (usually to a gridpoint). Programs such as Easy CAD and Generic CADD require fewer menu selections and offer default values to execute such procedures more efficiently. **Score: Satisfactory.**

Coordinates of points can be entered without parentheses in Easy CAD, but relative coordinates always require the "@" prefix. Polar coordinates require the "<" prefix. This differs from Generic CADD, where the last type of coordinate entered becomes the default. This seemingly minor difference saves Generic CADD users considerable time when placing entities.

Easy CAD provides fine flexibility in placing objects through the use of many types of command modifiers and coordinate entry. Snaps are called Modifiers in Easy CAD, and it offers all the standard snaps — center, midpoint, endpoint, on an entity, parallel, perpendicular, tangent, and intersection. Some more unusual (but very helpful) snaps are also available, such as percent along an entity, angle to a line, degrees along a circle or arc, and bearing. **Score: Very Good.**

Point coordinates can be entered with absolute, relative, polar, or arc minute/second formats. Unlike Easy CAD, once one of these modes is selected, the user can continue using that mode with no additional commands.

When selecting objects, they can be easily scaled and rotated. Generic CADD offers the capability to view an object's outline before placing it. This unique feature eliminates unpleasant surprises.

Like Easy CAD, Generic CADD provides abundant snaps. These include: near line, endpoint, midpoint, arc center, component, tangent, intersection, parallel, perpendicular, and grid-point snaps. They can be executed by using the two-letter mnemonic command code, selecting the menu option, or programming one of the function keys. Though Easy CAD also offers this flexibility, snaps are a little easier to use in Generic CADD. **Score: Excellent.**

PERFORMANCE: PROGRAMMABILITY

Design CAD is by far the most programmable product. It is ideal for users who want to take the time to customize CAD to meet their individual drafting needs. You can write custom menus and macros and even create complete programs using the basic CAD language. A separate Program Encryption utility is included to allow use of a program without having the source code in an editable form.

Macros can be created from within Design CAD (by recording keystrokes) and executed from the keyboard, or added to the menu. This includes the capability to create additional single keystroke command macros.

With a text editor, you can modify and create new on-screen menus of commands. The program allows users to create menus that actually show symbols as graphical icons on the screen; this saves the user from having to remember exact symbol names. **Score: Excellent.**

There is no programmability other than being able to assign a few menu selections to the function keys. These can include macros, which are simple strings of commands. Although this is helpful, it seems too limited to be of great use.

Drafix CAD Ultra offers the least programmability of the four packages reviewed here. **Score: Poor.**

Easy CAD includes a very powerful and easy-to-use macro language. Once users become advanced enough to be annoyed at the command paths, they will be ready to learn how to customize the program.

The pull-down menus can be customized to rearrange the commands, and additional menus can be created for automating tasks and eliminating the number of required mouse clicks. Use of this capability is absolutely necessary to make Easy CAD efficient enough for daily, professional use. Once the basics of the program are mastered, every user should create custom menus to streamline the command sequences they repeat most often. **Score: Very Good.**

Generic CADD does not have a programming language, and the macro capabilities are essentially limited to simple strings of CADD commands.

Macros can consist of up to 80 characters in length, and can combine any of the regular drawing and editing commands. In addition to the CADD commands, macros can create a pause and prompt the user to enter points or numeric values.

Programmability is certainly one area where the program could use some improvement. **Score: Satisfactory.**

PERFORMANCE: INPUT/OUTPUT CAPABILITIES

The Design CAD Plot Sorting routine optimizes a drawing for plotting. Usually CAD drawings are plotted in the order that entities were drawn, which can be inefficient after a drawing has undergone extensive editing. This utility sorts the drawing by layer, color, and location for the fastest possible plotting.

Various conversion capabilities are available through the external utility programs included with Design CAD. The optional conversions include import and export of .DXF, IGES, and HPGL, as well as export to .GEM and Postscript formats. These are all included at no extra cost — very unusual for low-end CAD programs. **Score: Very Good.**

We encountered no notable problems printing and plotting with Drafix CAD.

The company provides additional utilities (purchased separately) for .DXF transfer ($95), extended memory use ($195), 3-D drafting, and the Drafix CAD Report ($150), which extracts and presents attribute information from a drawing. The .DXF transfer and the 3-D package were tested and both installed flawlessly.

Drafix CAD Ultra handles .DXF file conversions with ease (after purchasing the appropiate file conversion program). The utility exports Dr. Halo paint files along with HPGL-, DMPL-, and Calcomp-compatible plotter files. It has excellent text input/output capabilities, but lacks IGES conversion capability. **Score: Very Good.**

Conversion to and from .DXF is available through import/export utilities, which are included with the program. These utilities also convert drawings to .EXF — the Evolution Exchange Format, which is the Easy CAD ASCII file format.

A large number of devices are supported, although we could not find a list of them (except by running the Install program). There is also a macro included that allows you to switch between two devices, such as a printer and plotter.

If you choose not to write script files to automate the process, you are asked every question before every plot. Depending on your hardware, you may be asked for paper size, resolution, view to plot, and scale. You are also asked for the number of copies to plot, even though this only applies to devices such as laser printers. For all other hardware, this value is ignored, but you still have to enter it. **Score: Good.**

Generic CADD's output capabilities are more than adequate. A very large number of plotters and printers are supported at various resolutions.

Printing to a dot-matrix or laser printer is actually done with a separate utility program called Dotplot (which was once sold separately).

Other format conversions are available with the Generic Utilities package ($99). This product contains conversions to HPGL, DMPL, and Lotus .PIC.

The output utility Desk Convert is included with Generic CADD and is accessed from within the program. It includes conversions to Postscript and several pixel formats such as .GEM, .PCX, and .TIF. **Score: Very Good.**

Design CAD, Continued on Page 58

Drafix CAD, Continued on Page 58

Easy CAD 2, Continued on Page 58

Generic CADD, Continued on Page 58

Design CAD 2-D (Continued)

Drafix CAD Ultra (Continued)

Easy CAD 2 (Continued)

Generic CADD Level 3 (Continued)

PERFORMANCE: PROCESSING SPEED

Design CAD was the slowest of all CAD packages tested, with a time of 53 seconds to regenerate our test drawing. **Score: Satisfactory.**

Drafix CAD Ultra tied for second-fastest with Easy CAD 2. It regenerated the test drawing in 32 seconds. **Score: Good.**

Easy CAD tied with Drafix CAD Ultra for second place. **Score: Good.**

Generic CADD was at least twice as fast as the other low-end CAD packages reviewed; its regeneration time was 15 seconds. **Score: Excellent.**

DOCUMENTATION

The Design CAD documentation consists of a reference guide, a tutorial, and a quick-reference card. The reference guide is ordered conveniently, and commands are easy to find if you know their names. Nevertheless, the illustrations are crudely done, and the symbol illustrations are almost unreadable. The page layout is uninteresting, with little use of indentation, bold text, or headers. This makes it difficult to find critical information from each page.

Because the manuals are small-format, perfect-bound books, they are difficult to place face up on your desk. By the time we finished this review, the reference guide was already falling apart. A quick-reference card of all commands is supplied with Design CAD. This same information can also be accessed on-line while using the program.
Score: Satisfactory.

Drafix CAD Ultra includes a user's guide, a setup/installation guide, and a reference guide. The first two guides are printed as half-size, relatively thin stapled booklets that can be propped up on your keyboard for instant reference. Unfortunately, the technical reference manual and the getting started tutorials are perfect-bound, and therefore it is impossible to lay them flat (Version 4.0 will have three-ring binders); they also suffer from many typographical errors. The small format guides and manuals are easy to handle and very well done.

A comprehensive introduction to Drafix design concepts and operations is included in the technical reference manual. All the menu selections are also shown in a well-laid-out function reference. **Score: Good.**

The Easy CAD user guide is informative, and easy to read and understand. It has installation instructions, a section on CAD concepts, a tutorial, reference guide to the commands, information on customization and macros, and appendixes on hardware configuration, file types used, and conversion to. DXF and EXF.

The tutorial in the user guide consists of 13 lessons with step-by-step instructions for using most of the drawing, editing, and viewing commands, and dimensioning, part handling, and command modifiers. Some sample drawings are provided for the tutorial lessons.

The reference guide is arranged according to the menus. Thankfully, there is an excellent index that lists multiple references for each command. Once you find the right command the description is usually clear and concise with a helpful illustration. **Score: Very Good.**

There is no tutorial included in the manual, just a few pages on using the program, scale, coordinates, menus, etc. This is a deficiency with the documentation, but it is not as disastrous as one might think since the reference section of the manual is so strong. Each command is clearly described, and many step-by-step illustrations are included.

A card with all the two-letter mnemonic commands is included with the package. This is very important, since becoming familiar with these codes will allow you to take full advantage of the program's efficiency. **Score: Good.**

EASE OF LEARNING

Design CAD is a comprehensive and complex program. Any user should count on spending a good deal of time learning to use the commands necessary for typical design and drafting tasks. To take complete advantage of the program's powerful capabilities, you must be willing to spend even more time learning to customize it for your needs.

Installation of Design CAD is easy and painless. With the Installation Program, the program can be installed in less than 20 minutes. Hardware configuration is also very easy and efficient. A special configuration program is included that allows for independent configuration of any hardware device. If you ever change printers or video cards, you can quickly modify the configuration of the program for the new hardware.

Inexpensive videotape training courses are also sold by American Small Business Computers to aid both the beginning and more advanced Design CAD user.
Score: Satisfactory.

This program is quite easy to learn and has excellent file handling capabilities. The user interface tailors to new users. A great deal of information in the form of menus is always available on the screen.

Installation was a snap, except for a syntax problem in setting the resident directory and getting the digitizer to respond. The hardware configuration was taken care of by the installation program. Changes to the configuration are easily accomplished. **Score: Very Good.**

Easy CAD certainly lives up to its name by being one of the easiest programs to learn of the low-end CAD products we reviewed. Such features as pull-down menus, dialog boxes, and graphic aids (though not as numerous as in Drafix CAD) for layer and color selection contribute to the user's ability to learn the program quickly and painlessly.

Installation of the program was a breeze. The Install program prompts you through the entire process. Of course, the user must be familiar with his particular hardware configuration: type of video board, pointing device, and printer/plotter. There is on-line help that gives details for a specific device (e.g., switch settings, cable configuration, and other setup information).

One minor point is that once the program is installed, it is inconvenient to change any one part of your hardware configuration as you must run the Install program all over again. You cannot change one hardware device without respecifying all of them. **Score: Very Good.**

This program is definitely not as easy to learn as other programs that feature pull-down menus, dialog boxes, and good file handling. However, the video menus are reasonably well arranged and intuitive so you can immediately begin drawing. As you become more familiar with the command names, you will begin to memorize and use the mnemonic two-letter command codes, which drastically increase productivity.

Generic CADD includes a comprehensive configuration program, which can be used to change hardware selections after the program is installed. This makes it fast and easy to switch printers, change your video board selection, etc. The configuration program can also be used to set up many of the default parameters for functions such as screen colors, units, snaps, trims, and dimensioning.
Score: Good.

EASE OF USE

Once you get the program loaded, commands can be selected from the menu or by entering the entire command name. Most commands also have a Short Form name that can be entered from the keyboard. These short forms can be anything from one to four characters, a function key, or an Alt key. This variety of forms makes it difficult to memorize the names of even the most commonly used commands when compared to Generic CADD.

Design CAD has very good file management capabilities, allowing the user to select directories and files from the screen with his pointer. To load a drawing or symbol from disk, the name can be entered directly. If the name is not known, you can choose to display a directory listing and simply click on the desired file. For even more flexible file handling, the Directory command will display a listing of any directory and file specifications. **Score: Good.**

Design CAD, Continued on Page 59

This program absolutely shines when it comes to fast, efficient file management. Selection of disk drives, directories, and files for all file operations is made simple and intuitive by the menus. All programs should handle files this well.

While the program offers a host of powerful features, they were sometimes difficult to use. When compared to the more refined user interfaces of Easy CAD and Generic CADD, Drafix CAD Ultra is cumbersome.

While the many menus help first-time users, they can also overwhelm them. The designers of Drafix CAD Ultra seem to have gone too far by providing too much information for the first-time user without taking into account that user's future productivity with the product.
Score: Satisfactory.

Drafix CAD, Continued on Page 59

Many functions in Easy CAD are very flexible, which also results in some lack of efficiency for doing simple operations.

Many commands that require a value, (such as the fillet radius or chamfer distance) prompt you for that value each time you execute the command. In other words, if you want a constant fillet radius throughout the drawing you must still give an extra mouse click each time you place a fillet to select the default radius.

The efficiency of the program can be greatly increased by programming the function keys, learning the Ctrl-key shortcuts, and creating custom menus and macros to speed up command entry.

Selecting files to load is easy and intuitive; files are listed by name on a text screen so you simply point and click on the one to load. You can move between directories and disk drives just as easily. **Score: Good.**

Easy CAD 2, Continued on Page 59

Once you get through the initial learning period, you will find that Generic CADD's command structure and messages are consistent throughout the program. Basic and complex tasks are usually all executed in a similar fashion. Power users will discover many command shortcuts within the program.

When you start using the program, it soon becomes obvious that file selection and management is one of Generic CADD's real weaknesses. To load a file you must use the tedious method of typing in the name and path name. Still, the program's capability to streamline repetitive tasks outweighs this inconvenience. **Score: Very Good.**

Generic CADD, Continued on Page 59

Design CAD 2-D (Continued)	Drafix CAD Ultra (Continued)	Easy CAD 2 (Continued)	Generic CADD Level 3 (Continued)

ERROR HANDLING

The only capabilities in Design CAD for automatically correcting user errors are the Oops and Undo commands. These names are somewhat misleading, however, as Oops is really an unerase function and Undo simply erases the last entity that was drawn.

User entry errors are acknowledged by a beep. Error messages were few and far between. It is usually up to users to figure out what they have done wrong.
Score: Good.

The program's Restore command can undo up to 100 erasures or copy operations.

Except for memory errors we caused intentionally, all other forced errors were handled without loss of the drawing data. Recovery was even possible with the out-of-memory errors unless additional elements were added to the drawing database after the error occurred.
Score: Very Good.

User errors in Easy CAD 2 can be easily corrected, if recognized immediately, with a one-step Undo function.

Although the Revert command loads the last saved version, the program does not create automatic backup files, and in some instances it allows you to overwrite a file without giving a warning message.

Easy CAD handles errors in one of two ways: with a polite but useless message like "Easy CAD doesn't understand that," or by doing nothing. Several times commands were executed that produced no visible results and the program gave no clue as to the problem.
Score: Satisfactory.

Generic CADD supplies the user with warnings before quitting and before overwriting a drawing or component file.

The Unerase and Erase Last commands are included to help you correct errors. These commands will erase/unerase the last entity that was added to or deleted from the drawing. These commands can be used to work backward to the last time the drawing was saved or the database was packed. **Score: Very Good.**

SERVICEABILITY/SUPPORT POLICIES

American Small Business Computers sells its product direct and through dealers. The company offers a product usability warranty, private bulletin board, and a money-back guarantee. Unlimited technical support is available from 9 a.m. to 5 p.m. Central time, with no connect time limitation. **Score: Very Good.**

Foresight Resources offers a 30-day product usability warranty, 30-day money-back guarantee, and Compuserve bulletin board service. Support lines are open from 8 a.m. to 6 p.m. Central time. For an added cost, the company supplies training programs and a toll-free support number for corporate customers.
Score: Very Good.

Evolution Computing offers unlimited free support, a 30-day product usability warranty, and a money-back guarantee. Support lines are open from 8 a.m. to 6 p.m. Mountain time. **Score: Very Good.**

Generic Software provides unlimited free support (not toll free) Monday through Friday from 7 a.m. to 6 p.m. and Saturday from 9 a.m. to 12 p.m. Pacific time. The company places no limits on connect time and offers a 60-day product usability warranty and money-back guarantee. The company offers VIP phone support to corporate customers and runs bulletin boards on BIX and Genie.
Score: Very Good.

SERVICEABILITY/TECHNICAL SUPPORT

Design CAD's technical support staff is very knowledgeable, helpful, and efficient. They went out of their way to solve any problems we encountered during this review. We also experienced minimal time on hold. **Score: Very Good.**

Technical support responded quickly and knowledgeably to three calls on three different subjects. They were unable to help with a digitizer problem, which was probably hardware related, but they were on top of the others. **Score: Good.**

The Evolution Computing technical support personnel are quite helpful, once you reach them. All lines were busy for the first two calls we made, so the receptionist said they would call back. Unfortunately, it took them two hours to return the first call and the second call was never returned. When we finally got through, they were able to give some helpful hints, and were very prompt in faxing some requested information about third-party products. **Score: Poor.**

We had pleasant experiences dealing with the Generic Software technical support staff. They were always informative, concise, and polite. They quickly answered all of our questions, and our hold time was usually short. **Score: Very Good.**

VALUE

Design CAD 2-D costs $299. The program is packed with features such as multiple views, a powerful programming language, and a macro capability. While low-end users may be interested in ease of use and more capable symbol handling, this product comes with a load of useful features at a very reasonable price.
Score: Very Good.

The $395 Drafix CAD Ultra is one of the priciest products reviewed here. In spite of the high cost, we found it did not offer substantially more capabilities or ease of use than the other products. Generic CADD (the other high-priced product) came with a .DXF and memory management utility; for Drafix CAD Ultra, these utilities, though well done, are extra.
Score: Satisfactory.

Easy CAD 2, at $169.95, is the lowest priced product of the group. When you add the price of a symbol library ($95), low-end CAD users will get a lot of power for the price. With the strong drawing tools and the intuitive menus, users can quickly become productive CAD users.
Score: Very Good.

Generic CADD Level 3, at $399.95, is the most expensive program of the group. With the program, you get .DXF file transfer and memory management utilities (to make optimum use of expanded memory), powerful drawing tools, an easy-to-use interface, and blazing fast speed. Production drafters will want to seriously consider this product for their demanding needs. **Score: Very Good.**

PRODUCT SUMMARY

Design CAD 2-D

VERSION 4.0

Company: American Small Business Computers Inc., 327 S. Mill St., Pryor, OK 74361; (918) 825-5918.
List Price: $299.
Requires: IBM PC, PS/2, or compatible; 640K of RAM; MS-DOS 2.0 or later; hard disk drive; graphics adapter card and monitor; math coprocessor is supported but not required.
Pros: Powerful features; complete programing language; multiple view ports.
Cons: Poor symbol handling slows processing speed and ease of learning.
Summary: Users desiring the power of high-end CAD at a low-end price should seriously consider this product.

PRODUCT SUMMARY

Drafix CAD Ultra

VERSION 3.05

Company: Foresight Resources Corp., 10725 Ambassador Drive, Kansas City, MO 64153; (816) 891-1040, (800) 231-8574.
List Price: $395.
Requires: IBM PC, PS/2, or compatible; 512K of RAM (640K recommended); MS-DOS 2.11 or later; mouse; hard disk drive; graphics adapter card and monitor.
Pros: Symbol handling; many menus; attribute capabilities.
Cons: Interface is taken to extremes; point placement is weak; no programmability; high cost.
Summary: Drafix CAD Ultra offers the occasional CAD user a helpful interface for quickly putting the product to good use. However, as one learns the program, that interface tends to get in the way of productive work.

PRODUCT SUMMARY

Easy CAD 2

VERSION 2.3

Company: Evolution Computing, 437 S. 48th St., Suite 106, Tempe, AZ 85281-9936; (602) 967-8633.
List Price: $169.95.
Requires: IBM PC, PS/2, or compatible; 512K of RAM; MS-DOS 2.0 or later; hard disk drive recommended; graphics adapter card and monitor.
Pros: User interface is well thought out and easy to learn; strong symbol and file handling; low price.
Cons: If not customized, interface can get in the way; technical support slow to respond.
Summary: Inexpensive, customizable program is a top value.

PRODUCT SUMMARY

Generic CADD Level 3

VERSION 1.1

Company: Generic Software Inc., 11911 N. Creek Parkway S., Bothell, WA 9801 1; (206) 487-2233, (800) 288-3601.
List Price: $399.95.
Requires: IBM PC, PS/2, or compatible; 640K of RAM; MS-DOS 2.0 or later; hard disk recommended; graphics adapter card and monitor.
Pros: Top performer with powerful capabilities; easy to use.
Cons: Not as easy to learn as some of the other programs; documentation doesn't include tutorial.
Summary: Generic CADD Level 3 is admirably tailored to aid the computer designer. This quality, combined with the program's speed, make it well suited for the most demanding production drafting environments.

How We Test

Continued From Page 54

last point entered), and snap placement capabilities. Snaps are a boon to accurate placement of objects. For instance, when drawing a line or an arc, snaps are used as destinations (e.g., nearest grid point, nearest intersection) for the endpoint of that line or arc.

Multiple simultaneous view ports, fewer required keystrokes to accomplish placement functions than other products, and any other special aids also earn bonus points for the products.

Programmability: Low-end packages don't always have a powerful programming language. Nevertheless, the program should offer some level of customization (at least a useful macro capability for a satisfactory grade). Ratings are based on the level of customization provided.

Input/output capabilities: Programs must import and export .DXF files and support laser and dot-matrix printers for a satisfactory grade. All the programs support a mouse, a Summagraphics digitizer, and output files in HPGL (for Hewlett-Packard-compatible plotters), and DMPL (for Houston Instruments-compatible plotters). Grades are boosted depending on the availability of drivers for a variety of tablets, mice, plotters, and the flexibility in accessing those capabilities.

Processing speed: To benchmark the CAD programs, we used the sample Autocad drawing, Nozzle.dwg. We then placed 16 nozzles on the drawing screen of each program and tallied the screen regeneration time. The results coincided with our own impression of each program's speed.

Speed tests were done on a 386-based IBM-compatible PC with 4 megabytes of RAM, a math coprocessor, and a 60-megabyte hard disk drive.

Design CAD, although the slowest program of the group with a time of 53 seconds, performed well enough for daily use and earned a score of satisfactory. Products earned bonus points depending on how much faster they were at regenerating the test drawing. Drafix CAD Ultra and Easy CAD jumped up a scoring level for finishing the test in roughly half the time of Design CAD.

DOCUMENTATION:
Documentation scores reflect the quantity and quality of both written and on-line information. At a minimum, documentation should describe the product and how to use it. We reward bonuses for clear error messages, quick-start guides, on-line tuto-

FEATURES — INFO WORLD

CAD Software

■ Feature ☐ No Feature	Design CAD 2-D Version 4.0	Drafix CAD Ultra Version 3.05	Easy CAD Version 2.3	Generic CADD Version 1.1
Attributes	■[1]	■	☐	☐
Color screen resolution	1,024 X 768	1,024 X 768	1,024 X 768	1,024 X 768
Display colors	256	16	16	256
Levels (layers)	63	256	256	256
Multiple simultaneous views	6	☐	☐	☐
Keyboard command entry	■	☐	■	■
Relative coordinate mode	☐	■	☐	■
3-D drafting add-on	■	■	☐	■
Coprocesser support	■	■	■	■
Expanded memory support	■	■	■	■
Extended memory support	☐	☐[2]	☐	☐
Automatic dimensioning	■	■	■	■
Associative dimensioning	■	☐	■	☐
DXF file exchange	■	☐[2]	■	☐[3]
Third-party utilities	■	☐	■	■
Third-party applications	■	☐	■	■

[1]Rudimentary capability.
[2]Sold separately by Foresight Resources Corp.
[3]Sold separately by Generic Software Inc.

Two Programs That Didn't Fit Our Low-End Category

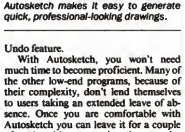
Trying to fit software into neat categories is not the easiest thing to do. When examining the low-end packages in this review, we found features in some of the programs normally found in higher-end products. Also, one product (Drafix CAD Ultra) seemed geared more toward the occasional drafter than the professional drafter.

Two interesting products that don't fit into our low-end category are Autosketch from Autodesk and Fastcad from Evolution Computing. Autosketch lacks some necessary features for full-time drafting, and Fastcad, while inexpensive, is a bit too complex.

AUTOSKETCH, VERSION 2.0. Autosketch is a product of Autodesk Inc., the developer of Autocad. It's an inexpensive professional CAD package for entry-level and high-end power users alike. Autosketch introduces the beginner to all the basic CAD commands and functions, and it contains some exceptional and powerful features that will satisfy even professional CAD drafters.

Autosketch's interface consists of pull-down menus, a cursor that changes shape depending on the operation selected, and a command line for occasional keyboard input.

Menu selections, where appropriate, remain in effect until changed. Drawing entities can be dynamically moved or rotated on the screen. Visual aids are used with virtually every command. You see the effect of a command before it is executed and if you make a mistake (even with all those visual aids), you may employ the program's convenient



Autosketch makes it easy to generate quick, professional-looking drawings.

Undo feature.

With Autosketch, you won't need much time to become proficient. Many of the other low-end programs, because of their complexity, don't lend themselves to users taking an extended leave of absence. Once you are comfortable with Autosketch you can leave it for a couple of weeks without worrying about retaining your proficiency. Unfortunately, the very things that make this such an easy program to learn also tend to reduce drawing efficiency.

There are a wide variety of symbol libraries available for Autosketch. Each library contains a complete set of professional symbols on industry and CAD standards. There are libraries covering everything from architectural symbols to clip art. Included are mechanical, electronic, and business icons; LAN and flowcharting symbols; and maps. It is easy to select and place symbols in drawings.

File management is a snap. You can locate files in any directory on your machine and call up drawings or symbols from a list displayed on the drawing screen.

Autosketch's strength lies in its ease of use and its practicality for infrequent CAD users and weekend drafting warriors. Autosketch is a great program for anyone who wants to design or draw at home or for the business person who needs to create quality presentations and layouts.

Autosketch costs $149.95. Autodesk Inc., 2320 Marinship Way, Sausalito, CA 94965; (800) 223-2521.

FASTCAD, VERSION 2.3. Fastcad is easy to learn and use and offers some great time-saving features. Fastcad has an extra set of icons on the right side of the screen that give you access to interactive command functions that can be used on the fly.

A good example is the zoom icon. You can zoom in on your drawing even when another tool is active. To place a line, for example, you can start the line, zoom in on a small portion of the drawing, and finish placing the line in the zoomed view. This is a feature lacking even in many high-end packages. Other icons that work on the fly include layer options, line types, hatches and fills, multiview windows, and grids.

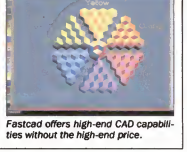
Another clever feature is its multiview windows capability. You can specify up to eight simultaneously active windows of any size and place them anywhere in your drawing. These windows can be changed, moved, added, or deleted at any time during the drawing process. Each window holds a selected view of your drawing. For example, one could hold an entire floor plan and the others could hold views of individual rooms. Editing any window causes simultaneous changes in all the other windows.

Fastcad has associative dimensioning and crosshatch patterns. Drawing and editing commands can be undone and redone. This package includes a programming language, reference to third-party products, an excellent quick-start tutorial and an extensive tutorial.

This is a powerful program that even a beginning CAD user can master. The program can also be tailored and modified to meet the stringent needs of the high-end user. And, of course, as the name implies, Fastcad is fast.

Of course Fastcad has its drawbacks; it is not really a low-end package due to its $795 price. And while it is an excellent value for the high-end user, it is a little expensive for most low-end applications, and its complexity may be intimidating to the beginning CAD user.

Evolution Computing, 437 S. 48th St., Suite 106, Tempe, AZ 85281-9936; (602) 967-8633.



Fastcad offers high-end CAD capabilities without the high-end price.

nals and help programs, quick-reference cards, and written tutorials. Poor organization, missing information, or incomplete indexes lower the score.

EASE OF LEARNING:
Ease-of-learning scores depend on the user interface and the intuitive design of the product. Other factors that influence this score include screen menu organization and the quality of documentation and tutorials. To earn a satisfactory score, the basic commands of a program must be learnable by novices to CAD software.

Relative ease of installation is also considered in ease of learning.

EASE OF USE:
Like ease of learning, ease of use is in large part a function of the program's design. It evaluates how easy the average user would find the program to use once the basics have been mastered.

Ease of use in CAD packages is judged primarily by the quality of the user interface. Programs that use intuitive commands and require a minimum of keystrokes receive higher ratings. Bonus points go to programs with alternative command interfaces, fast and intuitive file handling, and a forgiving menu structure.

ERROR HANDLING:
Packages that offer basic, accurate error messages and that do not make it easy for you to lose or corrupt data receive a satisfactory score. We award bonuses to programs whose error messages clearly explain the problem or, ideally, offer suggestions on how to resolve the problem.

Programs with undo, unerase, redo, and multiple undo commands earn bonus points. Automatic saves of your drawing files are also a plus.

SUPPORT:
Support is divided into two areas: support policies and technical support.

In scoring *support policies*, we begin with a satisfactory score and award extra points for product usability warranties, money-back guarantees, bulletin board support, a toll-free line, fax support, and corporate extended support. We subtract points when vendors provide no technical support or limit support to 30 or 90 days.

For *technical support*, we base our score on the quality of service we actually receive in the course of multiple anonymous calls to the vendor and the availability of knowledgeable technicians.

VALUE:
Value scores reflect the price (including the cost of utilities required to make the programs perform comparably) vs. the performance and features of each package tested, taking into account the competition.

This product comparison was developed by James R. White, Review Board; Alan Colmenares, Reviews Department intern; and Carla Mathews, Associate Reviews Editor.

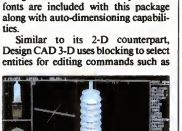
Low-End Packages Ease Users Into 3-D World

For drafters accustomed to drawing in two dimensions (pencil and paper), the need to work in 3-D may not be apparent. Nevertheless, working in 3-D offers clear advantages. Think of the advantages of building prototypes. With 3-D CAD, designers can build three-dimensional screen models of their designs, export perspective views to 2-D packages, and check the form and fit of their designs.

These three packages — Design CAD 3-D, Drafix 3D Modeler, and Generic CADD 3D Drafting — offer a less-overwhelming introduction to three-dimensional design than high-end 3-D products.

DESIGN CAD 3-D, VERSION 2.2. Design CAD 3-D is a powerful yet inexpensive ($399) stand-alone 3-D CAD program from American Small Business Computers, the company responsible for Design CAD 2-D. A variety of 3-D fonts are included with this package along with auto-dimensioning capabilities.

Similar to its 2-D counterpart, Design CAD 3-D uses blocking to select entities for editing commands such as



Design CAD 3-D produced the most stunningly shaded on-screen models.

move, rotate, erase, scale, extrude, and copy. It also includes attribute capabilities and a bill of materials option, comparable to those found in the 2-D program.

Design CAD 3-D includes the capability to display simultaneous views of your drawing at different rotations while you are constructing and editing it. The program also allows you to calculate the volume, surface area, and center of gravity of a solid; connect 2-D entities with straight or smooth surfaces to form a 3-D solid; vary the thickness of extrusions at points along the part; take a slice out of a solid; perform solid additions and subtractions; create intersections of one solid with another, and perform interference checks between solids.

This program can produce some impressive 3-D drawings (on-screen and on paper) of wire-frame, hidden-line, and shaded models. The shading is exceptional. Models are realistically rendered with good color blending, even though only 16 basic colors are available.

Unfortunately, Design CAD 3-D often comes up short in ease of use. It is difficult to take advantage of all the program's powerful features. As with any 3-D program, you should expect a long learning period. Design CAD 3-D can make even simple object entry and editing a confusing and difficult process. The documentation doesn't help matters. A tutorial is included, but it is vague and incomplete.

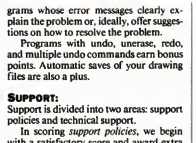
Design CAD 3-D has features not usually found in low-end 3-D programs. Design CAD 3-D is a program for the serious designer who needs solids capabilities at a reasonable price. The program may be a bit overwhelming for a first-time 3-D CAD user, but with a little patience users can look forward to some stunningly shaded drawings.

GENERIC CADD 3D DRAFTING, VERSION 1.1. Generic CADD 3D Drafting from Autodesk incorporates basically the same interface as Generic's 2D Level 3 program. This time-saving and inexpensive ($349) product makes 3-D accessible to a wider audience. It is an excellent solution for the beginning 3-D drafter as well as the graphics power user.

Generic CADD 3D does not have some of the higher-end design features found in other packages. What it does offer is an easy-to-use interface and excellent visual aids.

Creating a three-dimensional model is a very visual and intuitive process with Generic 3D. Some of the features that take the confusion out of 3-D drafting include color-coded axes (so it is always obvious in which direction the cursor is moving); on-the-fly selection of oblique, isometric, perspective, or flat views; single plane (xy, yz, and xz) modes for standard 2-D drafting; and quick and easy cursor alignment to any plane.

Basic 3-D objects such as boxes, cylinders, pyramids, and cones are easily created on-screen. These objects are shown dynamically as the cursor is moved so you can see what the result will be during creation. One of the handiest features is the capability to start at any point and track orthogonally through 3-D space; a color-coded path is drawn (temporarily) so you are aware of which axis you are traversing and how far you have moved.



Generic CADD 3-D's interface makes it easy to draw in three dimensions.

This program cannot be used as a stand-alone package for production drafting as it does not include text capabilities or many of the necessary editing commands. However, there are excellent conversion capabilities included for passing drawings between the 2-D and 3-D packages. Drawings from 2-D can be imported into 3-D, where elevations can be added with the powerful Extrude commands. 3-D drawings can be easily saved in the 2-D format so text, dimensions, and final editing can be completed there. By using Generic's Auto Convert package, the 3-D drawings can also be converted to .DXF for use in most other 3-D CAD programs.

This program also has hidden-line and point light source shading capabilities with options to use two to 16-color dithering, or 256-color shading. Three-dimensional symbol libraries are available, although the selection is limited to home design and furnishings symbols.

Generic CADD 3D has the best 3-D interface of all three packages. Moving around in 3-D space becomes quite intuitive after using the product for some time. For users eager to reap the benefits of 3-D drafting, Generic CADD 3D will not disappoint them.

DRAFIX 3D MODELER, VERSION 2.02B. The Drafix 3D Modeler from Foresigh Resources is a simple-to-use, inexpensive ($295) 3-D CAD add-on for Drafix 2D programs with a unique selection of on-screen, interchangeable menus. Unlike most CAD systems, which devote most of the screen to graphics, Drafix 3D uses only half the screen for the drawing area and the other half for displaying commands.

In the 3D Modeler you work within one of three modes: Create, Modify, or View. You can move in and out of each of these modes at any time while working on a drawing. Each mode has a slightly different interface designed to make its use as easy as possible. To help you locate and pick commands, the on-screen commands are highlighted. The highlighted command set is directly related to the operation you're performing.

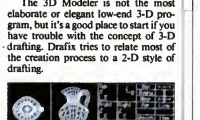
Drafix 3D Modeler has a unique way of creating three-dimensional objects on-screen. The Create mode consists of a 2-D drawing screen with a perspective view screen next to it. The drawing on the perspective screen is constantly updated to reflect what is drawn on the 2-D screen during the creation process.

On the 2-D screen, you first define the base or a section of the object. You then locate points that represent the height of the entity relative to the base of the drawing screen. For instance, if you were drawing a box, the 2-D screen would consist of a square and two points denoting the height of the box — the first point being the elevation of the base from ground level and the second point specifying the distance from the base to the top of the box. As the box is drawn the perspective screen is updated to show it in three dimensions. This is an intuitive way to make 3-D constructions.

The Domes feature is interesting, giving you the power to specify various dome sections by degree. This is much like taking half a ball and cutting off part of the lower portion of the bottom hemisphere.

One of Drafix 3D's strengths is its capability to create and modify complex surfaces. Simple patchwork surfaces are handled elegantly. Each surface contains 16 control points that are used to define it. By grabbing and moving these points, surfaces can be modified to create nearly any complex shape.

The 3D Modeler is not the most elaborate or elegant low-end 3-D program, but it's a good place to start if you have trouble with the concept of 3-D drafting. Drafix tries to relate most of the creation process to a 2-D style of drafting.



The Drafix 3D Modeler interface eases 2-D drafters into the third dimension.

Tool Book

Continued From Page 5

field, in which a field has different information on each page. This is how fields work in a traditional database; in Tool Book, each page acts as a record. In addition, you can tie scripts to "hot words" — words within your text that can then jump to other pages, containing more information (and perhaps more hot words) — the hypertext concept.

You can use Tool Book in one of two basic ways — as a reader or as an author. As an author, you create the various books and pages; readers then use the applications you have created.

Readers are limited in how they can affect books. They can read data, of course, and also enter information into fields (if the author has allowed it). Tool Book has a number of tools designed to make a reader's task easier, including the capability to search for information on a single page, in all the fields in a book, or in just certain pages. Readers can also see a history of the pages they have viewed. When entering text in a field, a reader has control over formatting (size and style), alignment, spacing, and indents.

Authors have complete control over the content and layout of the books themselves. Authors create books out of multiple backgrounds and pages, each of which contains various objects.

A background page is a template that contains objects that appear on multiple pages — such as a graphic, or a data field that you want to appear on all your pages. You can set up multiple backgrounds in a book. Foreground pages appear on top of a background and contain information that varies from page to page.

Objects, as mentioned above, can be fields, graphics, or buttons. You can easily define how your fields look, adding options such as scroll bars, shadows, or making a field transparent. Buttons types include check boxes and radio buttons, and again you can set various styles (for instance, you might want to set up a transparent button over a graphic).

Graphics can be created from the program's standard drawing tools or imported from various paint programs or an included clip-art library.

Authors use the "tool palette" to create standard objects: fields, record fields, buttons, and so forth. The tool palette also contains the basic drawing tools and other tools, as appropriate to the situation. If you select multiple objects on-screen, for example, an option appears that lets you group them together. Objects can be placed in various layers, which makes it easier to select them for editing, and you can also set colors and patterns.

No matter what kind of objects you use (fields, graphics, or buttons), you can connect them to a script. It is very easy to set up a basic script that moves from one page to another based on the selection of a button or hot word. You can create scripts by using a simple recorder or by typing commands using Tool Book's Open Script language. Open Script even lets you create crude animation, but it's very basic and doesn't include general animation tools such as "tweening." The concepts behind Open Script will be very familiar to users of Hypercard's HyperTalk, although the semantics are different.

Tool Book offers several other features that have been, until now, more common to databases than to object-oriented environments. You can set the sort order for the pages in a book by any record field for pages with a common background. The environment also includes tools for creating basic columnar or group reports (for things such as mailing labels). Such features are notably absent from packages like Hypercard.

Toolbook lets you open multiple instances of a single book. Authors can use multiple passwords to restrict who is allowed to open, save, or modify applications. And Tool Book (and the Windows 3.0 environment itself) comes with Day Book, a visual personal information manager written in Tool Book.

Of course, Tool Book is not the only PC program to have object-oriented and hypertext features. There are other object-oriented programming environments designed for end-users (such as Spinnaker's Plus, due out for Windows shortly) and for professional programmers (such as Whitewater's Actor, Digitalk's Smalltalk V, and Layout). You can also get object-oriented programming, although not the visual interface, in languages such as Microsoft Quick Pascal and Borland Turbo Pascal 5.5, or Borland, Glockenspeil, or Zortech's versions of C++.

Still, a few distinguishing features characterize Tool Book. It includes good drawing tools, color support, and various database and reporting features. Yet it's among the simplest of programming environents for the casual programmer. The one thing I'd like to see is the addition of a compiler, because Tool Book applications can be somewhat sluggish.

Selling for $395, Tool Book may not quite bring programming to everybody, but it's definitely a big step in the right direction for PC users.

Asymetrix Corp., 110 110th Ave. N.E., Suite 717, Bellevue, WA 98004; (206) 637-1500.

First Look examines new personal computer products before they have been through a formal review. Hear Michael J. Miller discuss other products weekly on the Business Radio Network's "Computing Success," Sundays, 1 to 3 p.m. Pacific time.

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EDITORS' CHOICE AWARD WINNER

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IMPRESSIONS

Qsort 5.0 Quickly Sorts ASCII, Binary Files on Multiple Fields

Dqsort sorts Dbase files, half again as fast.

Some utility programs seem obscure and trivial until you need them. Qsort, Version 5.0 from System Enhancement Associates is one of those gems. It quickly sorts ASCII or binary files on single or multiple fields with the flexibility to handle even the most arcane requirements. A separate utility included with the product, called Dqsort, is designed specifically for sorting Dbase files. Dqsort maintains the integrity of memo fields, but does not update index files.

Many applications, including DOS, have sorting utilities. Why, then, a separate utility just to sort files? Sorting utilities in other applications suffer from various drawbacks. The sort filter for ASCII files in DOS, for instance, limits maximum file size to 63K and allows you to define only the starting column for the sort. Qsort provides options and controls far beyond what's implied by the simple term "sort." Qsort can do sorts you'd never dream of — but may be surprised to find that you need. In addition, sorts are much faster.

In experimenting with Dqsort, we found that on a 20-MHz 386 machine it sorted a 5,000-record .DBF file in 44 seconds. Dbase III Plus and Foxpro performed the same sort in 73 seconds and 69 seconds, respectively.

Why would you want to sort all of these files anyway? It depends on your application, but many situations call for a sorted file. With database files (and other applications as well), performance can be improved by storing the data in sorted order so that you can read information sequentially from the disk instead of accessing it randomly.

If you need to sort information on some basis other than the traditional ASCII sort, Qsort can perform numerical, lexicographical, binary, unsigned binary, and IEEE floating-point binary sorts in ascending or descending order.

Qsort can work with fixed- or variable-length fields (binary sorts require fixed-length records). File sizes are limited only by available disk space.

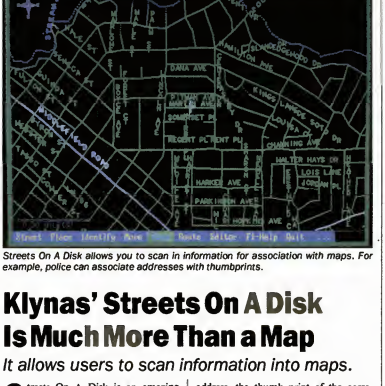
Qsort also includes a unique tagged record type that allows you to define records that are more than one line long. The end of a record is marked by a blank line or other character specified on the command line.

Qsort and Dqsort are command-line driven, with multiple parameters to control operation. Key specification parameters let you define any combination of sort keys determined by field number and/or starting column, field length, and field type. Since a complex sort can require many parameters, you can store them in a "command file."

Both Qsort and Dqsort require an IBM PC, PS/2, or compatible with 128K of RAM and MS-DOS 2.1 or later. The short 38-page manual is complete, and even includes an informative discussion of performance and the methods Qsort uses to perform its sorts. At a reasonable price of $50, Qsort is a worthy addition to your utilities arsenal.

System Enhancement Associates, 21 New St., Wayne, NJ 07470; (201) 473-5153.

— Judy Duncan



Streets On A Disk allows you to scan in information for association with maps. For example, police can associate addresses with thumbprints.

Klynas' Streets On A Disk Is Much More Than a Map

It allows users to scan information into maps.

Streets On A Disk is an amazing program that will aid you in finding where you are, where you want to go, or where you wish you were. Version 4.0, from Klynas Engineering, is a series of maps stored on disk. Once you get the base package, you'll need to get the modules or maps for the specific area that you are interested in.

As you start the program, you'll get the big picture of the entire region or county of your choice. You can then break the view down to just one city, and eventually one place or street.

Some of the main menu options in Streets On A Disk are: Street, Place, Identify, Move, Zoom, Route, Editor, View, Files, and Print. With these options available, you can search for street names and places, request a place on the map to be identified, or even move the cursor from one part of the map to another if you know the x and y or latitudinal/longitudinal coordinates.

The Zoom option will let you define an area inside a box and enlarge it or zoom in on it. You can also zoom back to the size preceding a given zoomed view.

The Route command allows you to create routes for traveling, and estimate distances, time, fuel usage, and cost. A great adjunct to this command is that it gives you the option of printing a map. You can edit a street or place and add your own personalized names.

The program's auto-place option under Route finds locations for places with a valid street address or coordinates. With View you can restore or save a screen image, shift the map display to various directions on the screen, and more. One of the bonuses to the Files command is that it allows you to load other maps of different areas.

You can also scan information into this product. This is extremely helpful to some police departments that use this feature to scan thumb prints into the program (for association with an address.) With a click of the mouse button on the address, the thumb print of the corresponding person pops up. Also with this version, you can display pictures in conjunction with places on the map. In addition to scanning, you can capture any image using any software that creates a .PCX file and have it displayed each time you identify a place.

Klynas Engineering sells the base Streets On A Disk package, including samples, for $225. The cost of any additional modules ranges all the way from $1,300 for Los Angeles to $60 for San Francisco. The average price range is $100 to $200, with an average size of 2 to 4 megabytes per map.

System requirements are an IBM PC, PS/2, or compatible with a hard disk, 512K of RAM, DOS 2.0 or later, and a VGA, EGA, or CGA color monitor, or a monochrome monitor provided you have a Hercules or equivalent graphics adapter. A mouse will make things quicker and easier, although it's not required. In addition, the program will support laser printers.

Klynas Engineering, P.O. Box 499, Simi Valley, CA 93062; (805) 583-1029.

— Zoreh Banapour

Zoom allows you to search for street names and places and request a place on the map to be identified.

SQL/A Tutor Steps Novices Through Introduction to SQL

Intimidated by the increased use of Structured Query Language (SQL) in popular databases? Not quite sure what SQL is, or how to apply it? Not to worry. Unify Corp.'s menu-driven tutorial software, SQL/A Tutor, steps you through a definition of SQL, its syntax, and basic operations.

SQL/A Tutor begins by asking you to identify yourself. If you have to leave the tutorial without finishing it, you can type in your name when you return and the program will place you back where you left off.

An introduction to SQL/A Tutor offers a mini-history of SQL, why it's useful, and who uses it. "Basic Concepts of SQL/A" teaches you what a table is and the role rows and columns play in a table and data manipulation. Throughout the tutorial, SQL/A Tutor uses model tables with plenty of examples of real-world data manipulation.

After you're comfortable with the idea behind tables, rows, and columns, you can move on to the lesson on Structure Query Language, which teaches syntax and some of the relational concepts behind SQL. Topics covered include the Select statement, selecting rows from a table, aggregate functions, calculations, subqueries, grouping, and joining tables.

Next on the menu is "SQL/A Tutor for Database Administrators." This lesson steps you through the data manipulation language, covering inserting, updating, and deleting data. The data definition language option under the Database Administrator menu talks about tables, indexes, views, and synonyms.

The "Security" lesson covers the grant and revoke options for the Select, Update, Insert, Delete, Alter, and Drop commands.

At the end of each of the discussions in the program, SQL/A Tutor quizzes you on what you've just learned. SQL/A Tutor may not answer all your questions about SQL, but for $199, it gives you a start on some basic SQL concepts.

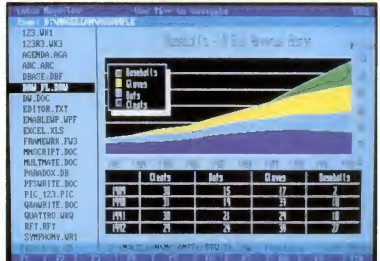
SQL/A Tutor requires an IBM PC, PS/2, or compatible, 256K of RAM, a hard disk, and MS-DOS 3.1 or later. A color monitor is recommended.

Unify Corp., 3870 Rosin Court, Suite 100, Sacramento, CA 95834; (916) 920-9092.

— Zoreh Banapour

Impressions are brief looks by InfoWorld *staff and reviewers at products that have not been through a formal review.*

REVIEWS



Among the many new file viewers added in Magellan 2.0 are those for various graphics file formats, such as the Freelance .DRW file above.

Magellan Adds File Viewers To Improve a Great Idea

Version 2.0 of this diverse utility program is more than a hard disk organizational tool.

BY PATRICK MARSHALL REVIEW BOARD

Lotus Development Corp.'s Magellan is one of those multifaceted utilities that's hard to pin down to a single category. *InfoWorld* has reviewed Magellan in roundups of both text databases (see product comparison, October 30, 1989, Page 55) and DOS shells (see product comparison, April 16, 1990, Page 57). Whatever category it's been associated with, Magellan has always ranked near the top. With the release of Version 2.0, Magellan should rank even higher, and this still-great idea may find itself included in a new category or two.

Magellan 2.0 retains the same basic look and feel of its predecessor. With files listed along the left side of the screen and file contents displayed to the right, it's a snap to find data that's scattered across your hard disk. Function-key commands (now reprogrammable) are displayed in a template along the bottom of the screen, putting all the program's major commands — from file management operations such as copying and deleting (Magellan allows you to view deleted files), to text searches and macros — right at hand.

FEATURES:

Despite recent stiff competition from PC Tools Deluxe, Norton Commander, and Xtree Pro Gold, Magellan is unmatched in its primary purpose: searching through and viewing files in their native formats. With Version 2.0, Magellan has expanded its support of file formats to more than 40. Lotus has also taken a bold step forward with the addition of the PK-Zip file compression utility. Now you can use Magellan to compress files to less than half their original size in some cases, and Magellan will let you view the contents of compressed files without having to unzip them first. You can even search through a zipped file for text strings.

Magellan is also a powerful file manager, though it is clearly not in the top rank, because it's set up more to view files than to perform mass operations on them. With the addition of several important features in Version 2.0, however, the program has notably more file management muscle. Magellan now sports an undelete utility and the capability to compare files and directories. What's more, Version 2.0 includes a full-fledged and flexible backup and restore utility and a verify feature for checking the integrity of files.

PERFORMANCE:

Magellan 2.0 requires 330K of memory to boot, nearly 200K less than Version 1.0 required, and the program will automatically take advantage of expanded memory if it is available. When you launch an application, Magellan occupies only about 6K of system memory. It now offers a high-resolution, 94-column display mode for users with VGA monitors.

Magellan pioneered native-format file viewers, and Version 2.0 enlarges the list of supported file formats. Several of the viewers offered by Magellan 2.0 — including 1-2-3, Release 3.0 and Agenda (both Lotus products) — are not available in other viewer programs. Virtually all of the major word processors are included, the only notable exceptions being the new programs designed for Windows: Word for Windows and Ami Professional.

Among the viewers added in Version 2.0 are several of the major graphics formats, including 1-2-3 .PIC files, Freelance .DRW files, and .PCX and .GIF files. (Graphics files cannot be viewed if you're running the program in the 94-column VGA mode.) Magellan even allows you to view files that have been compressed with the PK-Zip compression program.

Magellan's viewers are fast, taking about half a second to call up a file's contents, with the exception of those that display graphics files and compressed files. To view graphic images, you'll have to wait several seconds while the screen is redrawn. As for compressed files, the program takes an extra half-second or so to bring up the contents. The delay is a small and, for all practical purposes, unavoidable prize to pay.

Magellan's searching capabilities are unchanged and still powerful. Once you've indexed files (had the program categorize data and text), searching for character strings is a nearly instantaneous process. Boolean operators (and, or, not) can be used, and the program's fuzzy search routine will grab all files that contain the specified text string, or something close to the specified string. The program then ranks the files retrieved according the exactness of the match and the frequency of the text string in the file.

The program is also extremely quick at searching for character strings within a file. Using the Find command, all occurrences of a string in a text will be highlighted as you type it. And there's also a new quick-search feature that retrieves and displays only those lines in a document that contain a specified string.

Magellan is also very fast at indexing files. We had it index 4 megabytes of data in just under half an hour on a 286 running at 12 MHz.

For those who want to do more than just look at data, the program's "gather" feature will mark text in one file and dump it into another. The only problem with the gather feature is that it will only copy text. It would be nice if you could choose to move text instead.

Magellan offers a complete set of file management capabilities, including the capability to copy, move, and delete tagged groups of files either on a drive or across drives. Several major features have also been added in the current version of Magellan. Among the most important are an undelete utility, file and directory comparison, a flexible backup and restore feature, and the capability to preserve directory structures when copying groups of files.

While Magellan is up to most occasional file management tasks, it is not designed for heavy-duty work. Magellan does offer a tree view, though it's not as intuitive in design or as easy to move through as the trees found in some other programs, such as Xtree Pro Gold, Norton Commander, or PC Tools Deluxe. Nor will Magellan let you display two directories at once in a split screen, a significant omission for those faced with major disk housekeeping chores.

Magellan 2.0 also includes a text editor, which was supplied to registered owners of Version 1.0 on an update disk. The editor is adequate, though it can only be used on ASCII files of 20K or less.

Despite its weaknesses in file management, Magellan accomplishes its main tasks — finding and viewing files, and searching text — speedily and efficiently. Except for a few minor improvements we can imagine, this one-of-a-kind personal use utility easily earns a very good score in performance.

DOCUMENTATION:

Magellan comes with a very thorough, well-indexed manual. The only criticism we can find is that it is rather densely written and can be difficult to understand in places.

As with Version 1.0, Magellan 2.0 offers very well-designed, context-sensitive on-line help, a quick-start guide, and a tutorial chapter in the manual that leads users through the program's main features. In addition, there's a small booklet included that offers tips on how to get more out of using the program.

As if that weren't enough, Magellan 2.0 has a new "introductory tour." Created with Magellan's macros and customizable dialog boxes, the tour familiarizes users with the basic features of Magellan's screens. Magellan's documentation rates a very good score.

EASE OF LEARNING:

Installation is a snap. Magellan automatically reads your disk for applications and creates launch setups for loading them. The program recognizes 60 applications, and if you have a program that isn't among them, it's fairly easy to write a custom launch setup.

If you've been using Version 1.0, when you install Version 2.0 the program will merge your explore file groups, macros, and launch setups.

Magellan's basic features are well designed and easy to learn, though it can be tough to get the hang of some of the advanced features, such as writing macros or setting up multiple-index specifications.

Particularly in light of Magellan's complexity, the tutorial and new introductory tour are a great help in learning the program. Overall, Magellan earns a good score for ease of learning.

EASE OF USE:

Magellan has always rated high in ease of use. The layout of the program, with files on the left and contents displayed on the right, is intuitive. Virtually all of Magellan's commands are available in a function-key menu bar displayed along the bottom of the screen. Even better, those function keys can now be reprogrammed to let you arrange things just as you like them.

There are, however, a few obstacles to effortless use. The macro utility can be a bit confusing, and unless you constantly record new macros, you're likely either to have to refer to the manual on occasion, or to stumble along with trial and error.

ALSO IN THIS SECTION

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In addition, Magellan does not make file management operations as smooth as could be. Though you can access a directory tree, for example, the program's method of navigating through directories is not intuitive. And you can't split screens to display two directories or drives at once.

Finally, working with Magellan would be considerably easier if the program supported a mouse.

In addition to reprogrammable function keys, Version 2.0 has added two other features that boost the program's ease of use. First, you can set the program to update the index automatically after a specified period of time has passed with no keys being struck. Second, if you've deleted a file and change your mind, not only can you use the new undelete utility to recover the file, but Magellan will let you view the contents of the file to make sure it's the right one. Overall, Magellan rates a solid very good for ease of use.

ERROR HANDLING:
Magellan is a very solid program. The only way we were able to induce the program to crash was by running a macro that attempted to call itself up. Lotus has solved one earlier macro-related problem — a glitch that caused the system to lock up when a macro was assigned a name that already exists. Still, one macro trap door has been left behind for users. Magellan lets you record more than one macro to a single key combination. Fortunately, the program will only attempt to run the first macro on the list, but it would be better if the program at least notified users that a key combination was already taken.

The only other problem is that there's a nagging tendency for the highlight to overrun when cursoring through file lists.

On the plus side, Magellan's new undelete feature makes it a snap for users to recover from accidental deletions. And Magellan's developers thoughtfully included an escape key to let you interrupt the slow screen write that occurs when you try to view a graphics file. Error handling earns a good score.

SUPPORT:
Lotus provide six months of toll-free technical support. After that, free (but not toll-free) telephone support is available. Hours are 8:30 a.m. to 8 p.m. Eastern time, Monday through Friday. Support policies are rated good.

We had little trouble reaching the technical support staff. On two calls, we reached staff within two minutes. On a third call, we were on hold for almost three minutes. The staff was quite knowledgeable, tried to duplicate problems on the spot, and made several suggestions for alternative ways of accomplishing tasks. Technical support is rated very good.

VALUE:
Though Magellan provides many of the same functions found in other packages — such as Norton Commander, PC Tools and Xtree Pro Gold — and is not as complete a file manager, it is unique in its combination of viewing and text search capabilities. No other program makes it quite as easy to find files and view their contents in native formats. Virtually any user will find Magellan a personal productivity tool.

At $195, Version 1.0 of Magellan was a very good value. At the new, lower price of $139, and with all its additional features, Magellan 2.0 now earns an excellent score for value. □

Patrick Marshall is a longtime microcomputer user who writes on public policy issues for a news service in Washington, D.C.

REPORT CARD — **INFO WORLD**

UTILITY SOFTWARE

Magellan
VERSION 2.0

Criterion	(Weighting)	Score
Performance	(400)	Very Good
Documentation	(80)	Very Good
Ease of learning	(40)	Good
Ease of use	(120)	Very Good
Error handling	(80)	Good
Support		
Support policies	(40)	Good
Technical support	(40)	Very Good
Value	(200)	Excellent
Final score		**7.8**

PRODUCT SUMMARY

Company: Lotus Development Corp., 55 Cambridge Parkway, Cambridge, MA 02142; (617) 577-8500.
List Price: $139.
Requires: IBM PC, PS/2 or compatible; hard drive (with 1 megabyte of free disk space if you're going to index); 330K of system memory; DOS 2.1 or above.
Pros: Fast and flexible text searching; wide range of file viewers, including graphics and compressed files.
Cons: Lacks complete file management features; weak text editor.
Summary: Magellan 2.0 has secured the high ground as the preeminent program for searching and viewing files in their native format. With the addition of several graphic file viewers and the PK-Zip file compression utility, the program is stronger than ever.

Layout 2.0 Lets Users Build Complex Apps With No Code

Matrix Software's low-cost environment allows nonprogrammers to create powerful programs.

By John Walkenbach
CONTRIBUTING EDITOR

Object-oriented programming (OOP), graphical user interfaces (GUIs), hypertext, and computer-aided software engineering (CASE) all have made a significant impact on ease of use in applications development.

Layout, Matrix Software Technology's low-cost OOP environment based on a GUI, offers a little of each. Using Layout's Macintosh-like interface and flowchart applications development device, you can build and maintain complex programs without writing a single line of code.

FEATURES:

Layout is a graphically oriented system with pull-down menus and several applications development tools available in the form of icons.

Layout applications are similar in many respects to those produced by Hypercard (in the Macintosh environment) or Hyperpad (see review, August 7, 1989, Page 73). The most significant difference is the way in which Layout approaches applications development. It has no traditional scripting language; instead, Layout programs are developed primarily in a top-down manner using graphical "objects" arranged as flowcharts. The flowchart serves as Layout's language, and its objects are the building blocks for an application, including elements such as windows, menus, conditional operations, loops, and math functions.

Layout's methodology is most similar to Microstep, an applications development product from Syscorp that generates code from diagrams (see impression, May 21, Page 80). However, Microstep comes with its own Lattice C compiler, and allows menu and dialog box customization, whereas Layout does not.

A completed flowchart becomes the graphical specification for a Layout program. From there, you can either create a stand-alone .EXE program file (automatically compiled and linked by Layout) directly from the flowchart, or generate source code in one of three high-level languages, including Turbo C, Lattice C, Microsoft C, Turbo Pascal, or Quick Basic. (If you choose to generate source code, you'll have to provide your own appropriate compiler and linker.) Flowcharts may consist of hundreds of elements — as many as necessary to map the application you want.

In addition to using Layout to create applications, you can use it as a DOS shell by installing your own applications (for example, Dbase or Lotus 1-2-3 programs) as icons that show up on the main screen. Layout also offers rudimentary file management capabilities, such as copying, renaming, and deletion.

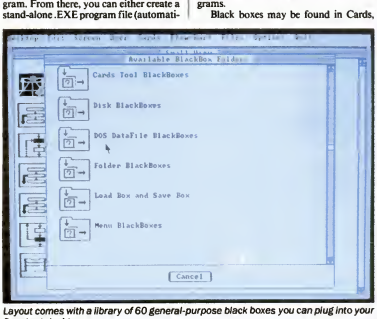
The term "object" is used in Layout to refer to both data entities and methodology entities in a program. Layout also employs what constitute true objects — entities that encapsulate into one unit both data and the methods that work on the data. Called "black boxes," these entities also are capable of inheritance and polymorphism — two other characteristics of true OOP.

Black boxes accept input, perform tasks, then give you the results of that task. One black box might automatically dial a number or change currencies. It could be an order-entry screen or a single button in that screen. A black box is capable of being used anywhere in the application or between applications. You can build black boxes inside Layout or through any of the languages it supports.

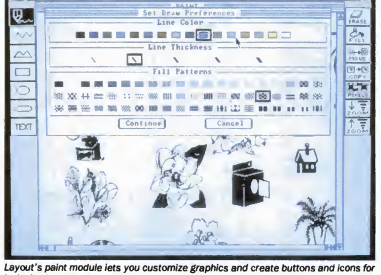
Layout comes with a library of about 60 general-purpose black boxes to handle routine chores that might normally bog down development, such as file functions, text manipulation, and date and time functions. In addition, Matrix sells two add-on black-box collections: a database package that allows you to build programs that can access and work with Dbase files, and another that adds telecommunications functions to your programs.

Black boxes may be found in Cards, another Layout tool used to create hypertext-based database functions. Layout's Cards are objects themselves and are similar to those used in Hypercard. Each card is loosely equivalent to a record in a database and is composed of a group of objects. Instead of containing only text and numbers, however, Cards may include buttons and even elements capable of displaying graphics. You can specify search criteria using cards, as in a standard database. Relationality is accomplished through easily created link buttons, which also let you access deeper levels of information, the trademark of hypertext.

Layout includes several other tools to help automate your application. Paint is a modest paint program that allows you to create graphics, action buttons, and icons for inclusion in your programs. Helpmaker lets you create context-sensitive on-line help. The Blackbox Manager tool helps maintain and organize user-created objects. Desktop, the Macintosh-like interface shell through which all the other tools are accessed and managed as icons, ties it all together.



Layout comes with a library of 60 general-purpose black boxes you can plug into your flowchart design.



Layout's paint module lets you customize graphics and create buttons and icons for inclusion in your programs.

PERFORMANCE:

Using Layout on a VGA monitor results in small text and graphics that are vertically squashed in appearance. EGA produces much better screen displays.

Layout cannot address expanded or extended memory, so you may not be able to use some of the Desktop tools until you close your active application.

Layout's hypertext and CASE features can save significant amounts of time in the design, coding, and debugging phases of application development. To test your work you can run through your flowchart in interpreted mode at any time, and execution begins immediately. When you're satisfied with your program, you can request a stand-alone .EXE file or source code.

In all cases, Layout works to fill your request quickly. Producing an executable file from a sample flowchart representing a fairly complex database program took us less than five seconds. Producing source code of the same program in Turbo Pascal took about 15 seconds. It took us a total of about 10 hours, including learning time, to build our own program in Layout based on an imported Dbase file. Again, execution times were negligible. You can freely distribute any application you create with Layout.

Black boxes can be either RAM or disk based. The latter work like overlays and are loaded into memory only when needed. This will slow things down some, but you can develop larger applications.

The paint tool includes a good assortment of drawing tools that can be used to develop simple art for use in your programs. You can zoom in or out, and a "fat bits" option lets you work with individual pixels. You also can assign your own control keys to avoid having to pull down the menus to change things such as line width or color.

Layout's file manager capabilities are functional but extremely basic. Our main complaint is that you can't disable the file icons and obtain a text listing of files; this would allow you to view more files at once.

It's a minor quibble, however. For the programming novice, Layout provides a way to avoid programming and still develop complex applications. For the professional, who may prefer to program, Layout can be used for quick prototyping of some of the cut-and-dried portions of an application, such as the interface, leaving the remainder of the program open to tweaking through source code.

Layout efficiently creates custom applications; we rate performance very good.

DOCUMENTATION:

Layout's documentation is a mixed bag. The quick-start guide and 350-page user manual both are well written and easy to read. The tutorial does a good job of stepping you through developing an application. (One of the tools on the main menu screen also is labeled a tutorial; however, it's more of a brief overview and consists of only a few screens laid out to represent a book.)

The context-sensitive on-line help system is thorough and easy to maneuver through. However, the help window accommodates only 16 lines of text, and cannot be resized or moved.

There is no reference manual, a significant omission in a product of this caliber; we missed having some of the information such a manual could provide, such as a concise summary of the flowchart objects.

We rate documentation satisfactory.

EASE OF LEARNING:

Installation takes about 15 minutes and requires about 3 megabytes of disk space. (If you don't plan on using an external programming language, you can reduce

the disk space requirements by deleting the supporting files for the programming language.)

If you have at least some programming experience, learning Layout will be a little easier — although many of its concepts and techniques are far removed from traditional programming languages. On the other hand, Layout is much easier to learn than a traditional programming language, because in many cases, the developer doesn't have to deal with specific details. For example, if you want to allow the user to select a file, you simply plug in the supplied black box that handles file access. Another advantage of Layout is that you can start out simply and add parts to your application as required.

Even so, don't expect to begin churning out applications immediately with Layout, even if you're an experienced programmer. Layout is complex and feature rich, and there's a great deal to learn before you can use it to its full capacity. The best way to master it is to work through the manual's valuable step-by-step tutorial, which guides you in developing a semi-complex application that employs most of the frequently used features.

We rate ease of learning satisfactory.

EASE OF USE:

If you've used Windows or OS/2 Presentation Manager, Layout's GUI will certainly seem less sophisticated by comparison. It lacks full control over colors, and the user cannot move or resize the windows. By and large, however, the interface is consistent and will be easy for either developer or end-user to employ.

With its pull-down menus and dialog boxes, Layout works best with a mouse; however, it's fairly easy to use the keyboard instead.

Layout's graphical flowchart methodology is intuitive. It takes little effort to implement the software's power once you've learned it; one keystroke or mouse click will turn a flowchart into an executable program or source-code module. Our only complaint is that the pop-up menu and dialog box approach is at times overdone to the point of inefficiency; sometimes it's easier to key in an item than obtain it through pick lists. A good example of this is the steps you must take to insert a simple plus sign in a formula. First you must choose "Add an Operator," and then select the plus sign from a list.

Editing an existing object also can be tedious, because you're forced to work through all of the pop-up menus that you originally used to create the object until you get to the aspect that needs modifying. For example, if you have a checklist

Layout comes with a library of general-purpose black boxes to handle routine chores that might normally bog down development.

REPORT CARD **INFO WORLD**

APPLICATIONS DEVELOPMENT SOFTWARE

Layout
VERSION 2.0

Criterion	(Weighting)	Score
Performance	(400)	Very Good
Documentation	(80)	Satisfactory
Ease of learning	(40)	Satisfactory
Ease of use	(120)	Good
Error handling	(80)	Satisfactory
Support		
Support policies	(40)	Very Good
Technical support	(40)	Satisfactory
Value	(200)	Very Good
Final score		**6.7**

PRODUCT SUMMARY

Company: Matrix Software Technology Corp., 1 Massachusetts Technology Center, Harborside Drive, Boston, MA 02128; (617) 567-0037, (800) 533-5644.

List Price: $199.95.

Requires: IBM PC, XT, AT, PS/2, or compatible; 640K of RAM; graphics card; hard disk; 3½ megabytes of hard disk space.

Pros: Produces stand-alone .EXE files or source code for C, Basic, or Pascal; allows application development with or without programming; Macintosh-like interface; inexpensive.

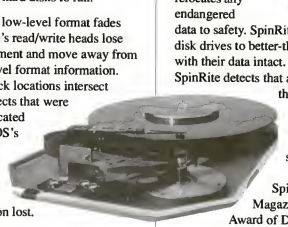
Cons: No extended or expanded memory support; menu and dialog box overkill in some instances.

Summary: Layout is a unique, inexpensive development environment that uses objects, hypertext, and flowcharts to graphically develop sophisticated stand-alone applications.

Hard Disks Die.

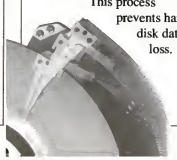
Hard disk manufacturers want us to believe that hard disk technology is absolutely reliable ... but experience teaches otherwise. We depend upon data storage to be flawless, but hard disk technology isn't. Surface defects, head alignment drift, and low-level format aging cause hard disks to fail.

A hard disk drive's low-level format fades with use. The drive's read/write heads lose their delicate alignment and move away from the original low-level format information. These new data track locations intersect unseen surface defects that were once harmlessly located between tracks. DOS's chilling "Abort, Retry, or Fail ?" message inevitably results. Precious data is soon lost.

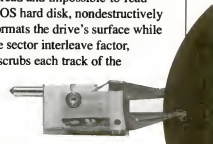


If left unchecked, data storage becomes more an act of hope and faith than one of science.

A return to science. The problem is known and understood, and the solution is clear. While a drive's data can still be read, the drive must be given a new, realigned and strong low-level format. Then all current surface defects must be located and managed. This process prevents hard disk data loss.



An act of prevention. Gibson Research Corporation's SpinRite™ software program reads hard-to-read and impossible-to-read data from a DOS hard disk, nondestructively low-level reformats the drive's surface while optimizing the sector interleave factor, analyzes and scrubs each track of the drive for surface defects, and relocates any endangered data to safety. SpinRite easily restores hard disk drives to better-than-new condition with their data intact. Before any data is lost, SpinRite detects that a drive is "softening" then determines and eliminates the cause. SpinRite readily recovers data that the system cannot read.



SpinRite won Byte Magazine's prestigious Award of Distinction and continues to win computer industry praise and acclaim. It has proven itself to be effective in preventing hard disk failure. SpinRite will work for you.

SpinRite II features a detailed technical log, as well as support for DOS 4 and large device driver partitions. It is available immediately from local software retailers or directly from Gibson Research with a 30-day satisfaction guarantee.

Suggested retail price: $89.

To receive additional literature or to purchase SpinRite II, call toll-free:

(800) 736-0637.

SpinRite II.
A return to science.
An act of prevention.

object with 10 options and you simply want to move it to a different location, you must go through more than a dozen dialog boxes to accomplish the task.

The more you work with Layout, the more you'll tire of the constant dialog boxes. On the plus side, once you develop objects that meet your needs, you can reuse them. We rate ease of use good.

ERROR HANDLING:
Layout handles common errors (such as open drive door, disk full, and incorrect file names) well. We experienced random, one-time glitches in screen updating that usually took the form of poorly constructed windows or illegible text. However, only rarely did these cause any serious problems, such as a system crash.

Layout has no debugger (the next version of Layout, due out this fall, will include a stepped debugger, according to the vendor), but you can pause your application at any time and examine the values of any variables. Unfortunately, you can look at only one variable value at a time; it would be nice to be able to scroll through a list of all values. Error handling is rated satisfactory.

It takes little effort to implement Layout's power once you've learned it.

SUPPORT:
Matrix offers unlimited free support on a toll-free line, fax support, extended corporate plans, an electronic bulletin board, and a free newsletter. We rate support policies very good.

All of our calls to technical support were either answered or promptly returned. Technical personnel appeared to know the product well and were eager to help. We rate technical support satisfactory.

VALUE:
Layout lists for $199.95. Its Dbase interface and telecommunications black box products sell for $69.95 each. There's also a $395 toolkit, a collection of software tools geared for professional programmers who want more technical information and procedures for accessing Layout's low-level interface functions and libraries.

You can use Layout's flowchart to directly generate executable programs, bypassing programming altogether. Or if you're an experienced programmer who wants to customize your applications, you can have Layout generate source code in one of three high-level languages, which you can then compile and link into an .EXE file.

An alternative to Layout may be Syscorp's similarly designed Microstep product, which comes with its own compiler and training class. Microstep offers more customization options for applications; however, it is many orders of magnitude more expensive ($7,500).

Layout is an inexpensive way for the nonprogrammer to create powerful applications; we find it a very good value. □

John Waikenbach is consumer research manager for a leading savings and loan association in Southern California.

Think Pascal Packs OOP Power, Ease of Use

Think Pascal 3.0 has OOP programming prowess, traditional functionality.

BY DON CRABB CONTRIBUTING EDITOR

If you plan to program on the Macintosh, you should consider learning about object-oriented programming (OOP). For some time now, Apple has been standardizing on object-oriented systems for its own Mac development with its Object Pascal language, Mac App interface environment, and support for a C++ compiler under the Macintosh Programmer's Workshop (MPW). Symantec's Think Pascal started to incorporate some OOP concepts in its last release, 2.0. With the release of Version 3.0, Think Pascal fully embraces the ideas and methods associated with object-oriented programming.

Symantec has some company in the Macintosh OOP arena. A slew of object-oriented software systems has popped up in the last year — TGS' Prograph (reviewed February 5, Macintosh Target Edition, Page S1), Maxem Corp.'s Cause, Smether Barne's Prototyper, Mainstay's VIP, and Apple's Smalltalk-80. In addition, Apple's Hypercard system supports some object orientation, as do Silicon Beach's Supercard (reviewed July 17, 1989, Page S10) and Spinnaker's Plus (reviewed November 6, 1989, Page S9).

Despite this move toward object orientation for Mac program development, most of the commercial Mac software on the market has been developed using the standard MPW Pascal compiler, in addition to Symantec's Think C and Pascal systems. As Apple and Symantec update these systems to incorporate OOP, more developers should start working with OOP techniques. (For a discussion of OOP concepts, see "The World According to OOP," Page 70.)

You can use Think Pascal 3.0 without the aid of its OOP element, since the basic language is still Pascal. As such, the program serves as a good bridge for old-time Pascal programmers who want to get their feet wet rather than plunge head-first into object-oriented programming.

FEATURES:
Think Pascal has been around since the dawn of the Mac in the form of Macintosh Pascal, an interpreter. And like the Mac, it has undergone numerous revisions. Version 3.0 is an evolutionary product — it builds upon the concepts, tools, compiler, editor, and debugger of Version 2.0.

Like Version 2.0, Think Pascal 3.0 revolves around *projects*, the organizational metaphor for all Think programs. Projects keep track of all the program source files, environmental files, library files, and all the segments of a Pascal application. The Think Project window maintains information about each file, including whether or not it needs to be recompiled. In short, the Project window frees you from the drudgery of file management.

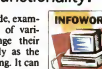
In Think Pascal, you write Pascal programs using a multiwindow text editor. The editor includes a "pretty printer" that automatically formats your code as you type and catches many syntax errors (such as missing semicolons or unbalanced "begin . . . end" groups). The pretty printer is sophisticated enough to give you a choice of many different display formats, character formats, sizes, and styles, which makes source code easier to read while accommodating different programming styles. The editor contains complete find-and-replace string commands that work across Project files. The editor also includes commands that facilitate finding function definitions quickly.

The beauty of Think Pascal 3.0 is that it doesn't lock you into the OOP metaphor. It's easier to solve some problems with traditional procedural programming — operations using highly sophisticated algorithms (which would have little utility as a method in other classes) or containing a bunch of complex computations (maybe a complex sorting routine, or a matrix inversion) are probably best coded into traditional Pascal procedures or functions. Think Pascal gives you this option, an advantage not offered by systems based solely on OOP, such as Parc Place's Smalltalk. However, because Smalltalk is purely OOP oriented, its object-oriented constructs are enforced more strongly than Think Pascal 3.0's.

Because Think Pascal includes a traditional fast linker and a Pascal compiler, it can also use source-code libraries from other systems, including Think C 3.0 and 4.0, Mac App, MPW (Macintosh Programmers' Workshop), Macintosh Pascal, MDS (Macintosh Development System), and MPW object files. It also works with the Mac toolbox and operating system routines, Apple's Object Pascal, and Apple's SANE (standard Apple numerics environment). Furthermore, Think Pascal 3.0 complies with the ANSI Pascal standard. It includes its own class library, too, the OOP equivalent of a function/procedure library.

The Think Pascal class library comes with prewritten objects to implement everything in the standard Mac graphical user interface (GUI). With the prebuilt Think Pascal objects, you can incorporate windows, menus, controls, and palettes, plus special interface additions such as floating windows and tear-off menus. The class library makes it much simpler to get a working Mac application off the mat and out the door.

One of the toughest aspects of writing a program in any language is fixing the logical and syntactical bugs that crop up in your work. Most language development systems on the Mac include debuggers to help with this process, and Think Pascal's source-level debugger ranks among the best. It lets you set break points in your code, examine the contents of variables, and change their values on the fly as the program is running. It can also run the program one step at a time. Even complex objects and structured data types such as records and arrays can be examined (i.e., each cell in an array can be viewed as its contents change). Overall, Think Pascal 3.0's source debugger is a powerhouse.

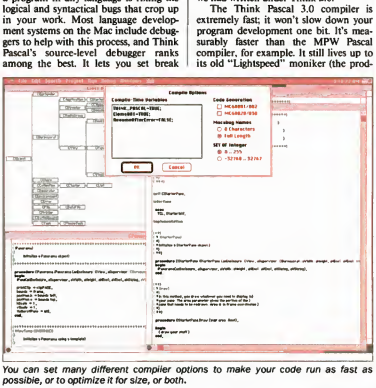


The Think Pascal 3.0 compiler is a fast multipass optimizer. It produces very tight and efficient application code that is typically smaller in size than that produced with MPW Pascal. The smart linker removes all the dead code (such as unused procedures and functions), which in turn speeds up the execution of your final stand-alone application.

This features list only scratches the surface of what you'll find bundled with Think Pascal 3.0. We could devote pages to the compiler options and project definition commands that let you build a standard Mac application, device driver, desk accessory, or code resources such as Inits, Cdevs (Control Panel devices), and Hypercard XCMDs and XFCNs (external commands and functions). Symantec has included support utilities such as Res Edit and Interface Toolkit for the MPW Projector facility (a set of built-in commands and windows that help programmers control and account for changes in code files). Think Pascal 3.0 is a complete Mac development system in every sense.

PERFORMANCE:
Swiftness distinguishes the Think Pascal 3.0 compiler. According to Symantec, the compiler can compile 44,000 lines of code a minute on a Mac II. While we didn't directly test that claim, we did compile a number of the sample projects included with the system, as well as code we had written under Think 2.0.

The Think Pascal 3.0 compiler is extremely fast; it won't slow down your program development one bit. It's measurably faster than the MPW Pascal compiler, for example. It still lives up to its old "Lightspeed" moniker (the prod-



You can set many different compiler options to make your code run as fast as possible, or to optimize it for size, or both.

uct was called Lightspeed Pascal before Symantec bought Think Technologies). As we mentioned above, the linker also optimizes your application for size and speed, by removing the dead code.

Applications written with Think Pascal 3.0 seem to run faster than those written with MPW Pascal, although this comparison shouldn't be pushed too far. If we were doing program development on the Mac we'd want both MPW and Think Pascal 3.0 in our toolbox, since they work so nicely together. Program design using Think Pascal 3.0 also "feels" faster than under Think Pascal, Version 2.0 or under MPW Pascal alone, perhaps because of the access you have to both OOP and traditional programming tools. Think Pascal 3.0 lacks the program prototyping capabilities of TGS' Prograph, but its class library makes it pretty easy to get your program shell on the screen quickly.

Given Think Pascal 3.0's combination of outstanding compiling, linking, and execution speed, plus its fully integrated, powerful OOP development environment, we rate it excellent in performance.

DOCUMENTATION:

Think Pascal 3.0 comes with three professional-level softcover manuals — a user manual, a resource and utilities manual, and a guide to object-oriented programming. Symantec also sells a separate on-line tutorial called "Just Enough Pascal," which we did not review. The three manuals cover what a Pascal programmer needs to know to get started with Think Pascal 3.0, but they won't teach you how to program. Symantec includes sample files that make it easier for a Version 2.0 user to get cracking with 3.0.

Think Pascal's documentation content goes far beyond what we've come to expect for a Macintosh programming system, surpassing the simplistic and mostly useless manuals we've seen accompanying some PC programming languages. Only the fact that you have to purchase the on-line help tutorial separately detracts from the score. Documentation is very good.

EASE OF LEARNING:

While Think Pascal 3.0 is a conglomeration of standard Pascal, Object Pascal, and the Think project-oriented development metaphor, it all hangs together amazingly well. Credit Think Pascal's project management system for making the sum of the parts better than the parts alone. This conspires to make Think Pascal 3.0 about as easy to learn as a Mac programming development system can be at the professional level.

Just about the only way Symantec could make Think Pascal easier to learn is to add a dedicated tutorial manual with on-line aids and software support. The tutorials included in the user manual *(Bullseye, Object Draw,* and *Hex Dump DA)* and on the disks are fine, but we would prefer to have many more of them. Even without this additional tutorial help, Think Pascal 3.0 shouldn't present any learning problems for users moving up from Version 2.0 to the 3.0, or to most other Mac programmers who want to acquaint themselves with Object Pascal. We rate ease of learning very good.

EASE OF USE:

Think Pascal 3.0 is as easy to use as

REPORT CARD — **INFO WORLD**

MACINTOSH PROGRAMMING LANGUAGE

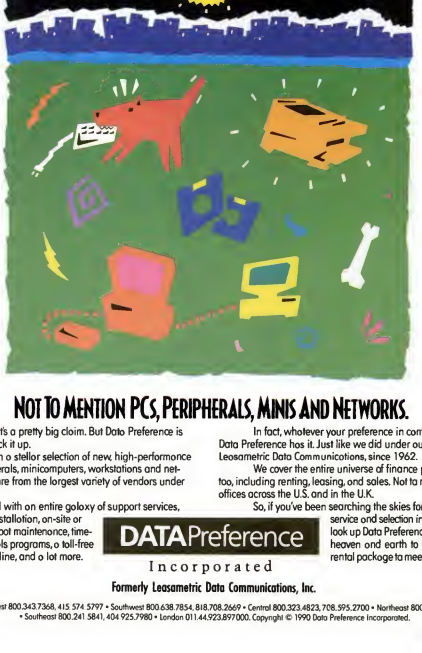
Think Pascal
VERSION 3.0

Criterion	(Weighting)	Score
Performance	(400)	Excellent
Documentation	(80)	Very Good
Ease of learning	(40)	Very Good
Ease of use	(120)	Very Good
Error handling	(80)	Very Good
Support		
Support policies	(40)	Satisfactory
Technical support	(40)	Very Good
Value	(200)	Very Good
Final score		**8.4**

PRODUCT SUMMARY

Company: Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014-2132; (408) 253-9600.
List Price: $249.
Requires: Macintosh Plus or higher with 1 megabyte of RAM; two 800K floppy drives; System 5.0 or later; 2 megabytes of RAM and hard disk required for Think Class Library; 4 megabytes of RAM and hard disk required for Mac App.
Pros: Complete, inexpensive Mac program development system — no add-ons are necessary, though some are available; very easy-to-use multiwindow programming system; useful program libraries.
Cons: Object-oriented constructs integrated into the Pascal language are enforced to a lesser degree than in a baseline OOP system, like Smalltalk.
Summary: With Think Pascal 3.0, Symantec retains its claim to having the reigning alternative to Apple's MPW. Version 3.0 adds considerable support for OOP techniques and methods without clouding the program's ease of use or diminishing its prowess as a development environment.

WE RENT THE SUN, THE MOON, AND THE STARS.



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Version 2.0, despite the OOP additions. It's also easier to use than MPW Pascal, and almost as easy to use as Symantec's other interpreter-based Pascal system, Macintosh Pascal. If you've had Pascal experience on other platforms or experience with other languages on the Mac, you won't have any problem using Think Pascal 3.0.

The multiwindow code text editor, class browser, and project windows are easy to manipulate and follow Mac conventions. The pull-down menus won't present any surprises, nor are they filled with a bunch of annoying hierarchical menu entries. Many menu selections have a command-key equivalent, but you won't be going to the menu bar that often, anyway. Most of your time with Think Pascal 3.0 will be spent in the code editor, and its menu entries are complete and clearly labeled. One minor complaint: Symantec doesn't provide tear-away menus, which you might like to use to customize your programming environment.

The separate text, drawing, debugging, and source-code windows allow you to develop a program on an individual as well as an integrated basis—a tough feat to pull off, yet essential for professional application results.

Aside from a lack of tear-away menus, a minor oversight, we can't find much to criticize in Think Pascal 3.0. The program's overall design fosters a solid familiarity with the system. Ease of use is very good.

ERROR HANDLING:

We didn't expect to encounter problems with Think Pascal 3.0's error-handling capabilities, since the program is based on a reliable predecessor, Think Pascal 2.0. We had no unexpected crashes, program lockups, or other anomalous behavior, even when we deliberately attempted to sabotage things. Warning dialog boxes always made sense, and we never encountered a fatal error that blew us back to the Finder.

The discussion of program error trapping, break points, and error messages is clear in the user manual, which includes a comprehensive error message appendix. Error handling in a programming environment is especially important, since you want to keep track of programming problems as they crop up and you want to separate design and syntactical mistakes from failures of the environment itself. Think Pascal 3.0 does both jobs well. The only feature we could ask for is the capability to continue compiling after errors have been detected. Think Pascal 3.0 forces you to correct compilation errors as they crop up.

We rate Think Pascal's error handling very good.

SUPPORT:

Symantec provides unlimited free support, though not toll free. Support is also available on Compuserve, though you may have to wait awhile for a reply. Symantec's support policies are rated satisfactory.

We tested the phone support lines on several occasions; each of our support questions was handled quickly and precisely. We rate technical support very good.

VALUE:

A full-blown Macintosh App/MPW system will set you back almost $1,000 by the time you add compilers. Personal OOP-style products cost considerably less. Hypercard, of course, is free with every Mac sold, while Prograph is $299, Supercard is $199, Plus is $199, the V.I.P. system is $299, Prototyper is $299, and Smalltalk-80 is $599.

Compared to these products, Think Pascal 3.0 is a bargain at $249. It has considerably more programming and development prowess than any of the other personal OOP packages. It's also better suited than Smalltalk-80 for developing Mac applications that have to take advantage of existing code libraries and programming skills.

We rate Think Pascal 3.0 a very good value, since it truly does live up to its marketing slogan, "The fastest way to finished software." □

Don Crabb is the director of laboratories and a senior lecturer for the department of computer science at the University of Chicago, as well as a contributing editor for InfoWorld. *He can be reached on Applelink at AO1992 and over the internet at decc@cs.UChicago.edu.*

The World According to OOP

Think Pascal 3.0 is a true object-oriented system, built upon the basic Pascal language and enriched with OOP extensions, most of which follow Apple's Object Pascal standard. As with other procedural languages and systems, such as C and Basic, in traditional Pascal implementations you approach data and algorithms separately; they form distinct entities. Algorithms form the basis for specific chunks of code (procedures, functions, subroutines, and subprograms) that act upon data which are restrictively and definitely classified.

By contrast, OOP languages merge your data and algorithms as *objects* and *classes* of objects, which have properties and *methods* associated with them. Objects represent a combination of data and the procedures or functions that act on them; classes are specific types of objects that serve as templates, stating the structure of the object's data and the actions that may be performed on that structure, and methods are the agents that act upon objects, corresponding to functions or procedures in traditional Pascal. Objects communicate with each other through *messages*, which are the equivalent of a function or procedure call.

(For a more detailed overview of OOP language structure, see our product comparison on PC OOP languages, April 30, Page 59.)

Since it's an amalgam of OOP features and a superset of traditional Pascal, Think Pascal 3.0 supports both object programming and standard Pascal function and procedure calls. To keep track of your object class definitions and object libraries, Think uses a class browser (not unlike the browser found in Smalltalk) that pops up an editing window in which you can edit your object class declarations and methods definitions.

Objects, of course, form the basis of any OOP language and development environment. All the actions that take place in a full OOP system are the result of objects messaging other objects.

The process and the information breakdown for defining a subclass using the OOP aspect of Think Pascal 3.0 will remind traditional programmers of the syntax for defining a record, but the similarity ends there. The functional difference between standard Pascal records and Think Pascal 3.0 subclasses is enormous and helps highlight the power of OOP.

To make it easy to reuse defined classes and instances, you can use the OOP property of inheritance, perhaps the most powerful object construct found in Think Pascal 3.0. It allows instances (descendants) of the same class (ancestor) to inherit properties or behaviors from all those classes that precede it in your overall object classification scheme. Inheritance reduces repetitive coding, simplifies overall application design, and speeds compilation. In addition, Think Pascal allows you to modify inherited methods within objects. This technique, called polymorphism, also speeds code development.

For example, suppose you define a class with the name Salaried Employee. Using OOP terminology, you can designate Salaried Employee to be a descendant of a more global class, like Employee (the "superclass"). Within Salaried Employee, you can define instance variables, such as Monthly Salary, Birthdate, and Name, that may be inherited from Employee. With polymorphism, you can also redefine the methods that return Salaried Employee's name, age, or monthly salary, along with messages that will be generated when those methods are invoked. You can't even come close to this level of data/algorithmic integration in traditional Pascal.

REVIEW RESPONSES

The Mouse Not Mentioned

The sidebar to your April 23 product comparison (Page 72) showed a picture of the IMCS (Paso Robles, California) Mousepen without mentioning it in the article.

I've been using the Mousepen for about three months on a Compaq SLT. I find it requires a surface only 3 or 4 inches square — less space than a trackball takes. I don't have to clear off any desk space, because whichever paper is on top is my pad. Away from my desk my favorite pad is my right thigh.

The Mousepen provides physical feedback, and uses the natural movement of a pen or pencil. Anybody who has had to work with pencil, paper, and a keyboard, sometimes types with the pencil between their fingers. The same thing works with the Mousepen. At less than an ounce, you don't need to ever put it down.

Richard N. DeLiberty
Carmel, IN

Clarion: Updates and Upgrades

Based on the glowing review in your January 8 comparison of relational databases (Page 51), I purchased Clarion Professional Developer, Version 2.0 on January 22. I agree that it is an outstanding product.

I began receiving promotions for Version 2.1 about a month after my purchase. But despite the statement accompanying my registration card that registered users were entitled to a "a free Clarion update," I was told that I would have to pay $150 for it because only one minor bug-fixing "update" was free.

I feel that using misleading statements to promote a product in an effort to create a new profit center is unnecessary if you have a good product, which Clarion does.

Paul Songer
Pompano Beach, FL

Clarion refers to bug fixes as "updates" and major releases as "upgrades." If you purchased Version 2.0 after November 15, 1989, the upgrade to Version 2.1 costs $100; if you purchased 2.0 within 30 days before 2.1 was released (April 23), the upgrade costs $50. You're entitled to one free update to Version 2.0. All other updates to Version 2.0 or 2.1 cost $29.95. — Editors

AT&T Technical Support

In a review response in the April 16 issue (Page 85) the vice president of marketing and support of AT&T Computer Systems took exception to *InfoWorld*'s rating on its technical support. I take exception to his claim.

We have two AT&T 6300 computers and have found AT&T to be not as helpful as other support lines, as well as expensive. We had problems installing an AT&T expanded memory board. After much discussion, they were unable to help, yet billed us $120 for the time.

Alan Katz
Katz, Steinman P.C.
New York

My personal experience with AT&T indicates it has no reason to be proud of its customer support. For a problem I had with an AT&T computer's time clock, I wrote seven letters to the AT&T Customer Systems Support Center and never received a reply.

John R. Gilman
New Ulm, MN

Turbo Pascal vs. C++

Your product comparison of object-oriented programming languages (April 30, Page 59) overlooks some deficiencies in Turbo Pascal. Turbo Pascal 5.5 does not let you redefine built-in functions such as "+". For example, while one may define an object to handle, say, complex numbers, you cannot say:

```
COMPLEX x,y,z;
x:=y+z
```

because there is no way to redefine the "+" operator.

Additionally, Turbo Pascal 5.5 does not have private variables or private methods; C++ does. Objects must be explicitly initialized, where C++ would allow a date, for instance, to be initialized with your choice of "May 1, 1990," "5/1/90," or "(5,1,90)."

C++ is not perfect. I find some of its rules obscure and arcane. But all the necessary pieces are there. Better to have too many tools than too few.

Arthur Metz
Los Angeles

Correction

The phone number printed with the Dbfast Windows review (May 14, Page 77) was incorrect. The correct number is (206) 562-1157.

InfoWorld *welcomes comments about its reviews. Letters are subject to editing for space and clarity. Please address correspondence to the Reviews Editor,* InfoWorld, *1060 Marsh Road, Suite C-200, Menlo Park, CA 94025.*

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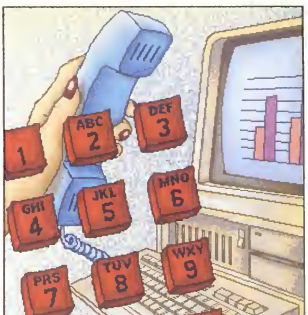

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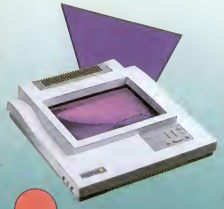

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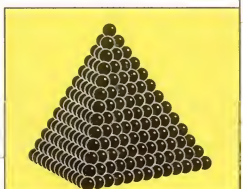

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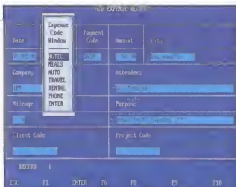

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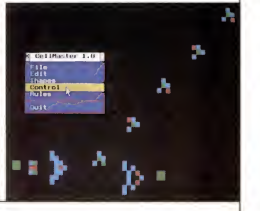

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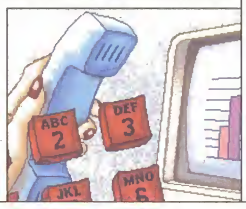

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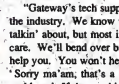

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4MB Memory Exp. Bd	113645-001	Deskpro 386/20e	799⁰⁰
4MB Memory Exp. Bd	113634-001	Deskpro 386S	799⁰⁰
1MB Memory Exp. Bd	117428-001	286E	469⁰⁰
4MB Memory Exp. Bd	117429-001	286E	1299⁰⁰
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4MB Upgrade Bd	108070-001	386/16	1299⁰⁰

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256 x 9 IBM	14⁰⁰	19⁰⁰	29⁰⁰	33⁰⁰	59⁰⁰
1Meg x 8 Apple	—	85⁰⁰	95⁰⁰	99⁰⁰	—
1Meg x 9 IBM	—	84⁰⁰	89⁰⁰	94⁰⁰	109⁰⁰
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80287	6MHz	129⁰⁰			
80287-8	8MHz	169⁰⁰	80387-SX		299⁰⁰
80287-10	10MHz	219⁰⁰	Above Piggyback 512K exp 2 Meg #4220		149⁰⁰
80C287-12 Laptop		289⁰⁰			

AST

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2 Meg..... **259⁰⁰**
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Specify Machine Type

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Description	Equiv. IBM#PS2 Part #	For Model	Your Low Price
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1MB Module	64508603	70-E61 & 121	139⁰⁰
2MB Module	**64508604**	**70-E81 & 121**	**249⁰⁰**
2MB Module	64506608	70-A21	259⁰⁰
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2MB Mem. Board	64505379	80-111 & 311	499⁰⁰
2MB Exp. 8MB	64506605	70/80	1249⁰⁰

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256 x 1	2⁰⁰	2⁰⁰	2²⁵	2⁷⁵	4²⁵
256 x 4	—	8⁹⁵	9⁹⁵	10⁹⁵	13⁹⁵
1 Meg x 1	—	5²⁵	6¹⁵	6²⁵	7²⁵

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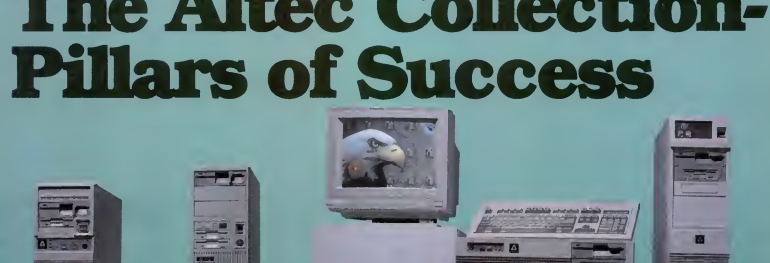

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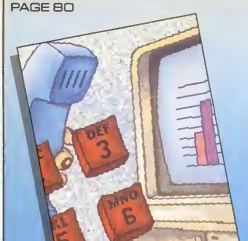

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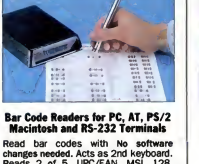

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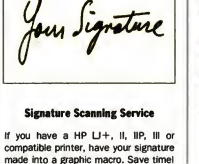

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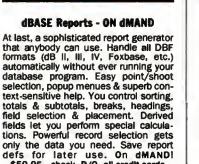

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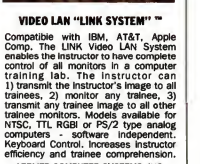

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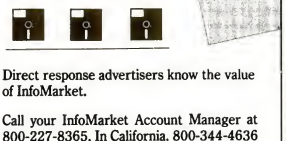

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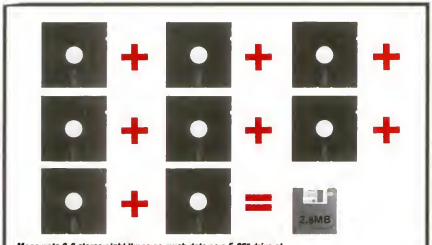

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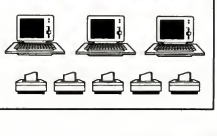

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